entire oil and gas fields of the State that owns its gas supply. It has made very low rates, as shown later, and yet derives sufficient income to make many municipal improvements.

While investigating the Kansas oil fields in 1899 Mr. I. N. Knapp had his attention called to the oil in these city gas wells. Considering the showing sufficiently favorable to warrant him in prospecting for oil, he obtained leases over quite a wide area and began prospecting both east and west of the city of Chanute. It was but a short time until he had a number of fair oil wells in the valley east of the town, and in June, 1900, he began shipping oil to Omaha and Kansas City gas companies, with which he made contracts. This was really the beginning of the oil development in the vicinity of Chanute.

Mr. Knapp was followed by a company composed principally of local business men and citizens of Iola, who organized the Neosho Valley Development Company, obtained leases, and began drilling. They had fair success from the start and soon had a number of producing wells. They were soon followed by a company composed principally of Kansas City business men, who organized the Southwestern Development Company, which likewise secured leases in the river valley and met with fair success in obtaining oil. From this time on the development was rapid. At the end of a year there were derricks and pipe lines all along the river valley to the east and north of Chanute and halfway to Humboldt. In the midsummer of 1902 the Prairie Oil and Gas Company built a large storage tank at Chanute with a capacity of almost 40,000 barrels. This was followed by a pipe line between Thayer and Chanute which, joined to the Neodesha-Thayer pipe line, gave Chanute a direct pipe line connection with the Standard refinery at Neodesha. A pump was established and the first oil turned into the line about the middle of December, 1902. The Prairie Oil and Gas Company at this time began extending its lines to oil tanks here and there all through the field. By July, 1903, these had reached as far north as Humboldt and had been carried eastward to the upland developments to the east of Humboldt and northeast of Chanute. During the calendar year 1902 the Chanute territory produced over 165,000 barrels of oil, and could have marketed much more if there had been pipe-line connections. In the first half of 1903 the production was raised from 50,000 to 75,000 barrels per month, with the number of wells constantly increasing.

Development was gradually extended southward down the river, with only moderate success, in the vicinity of Austin. A few fair oil wells wese obtained in the vicinity of Shaw. Still farther south a few good wells had been obtained near Urbana and Earlton and in the territory lying to the northeast of Thayer, in the extreme southwest corner of the Iola quadrangle. Gas development likewise extended rapidly

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in different directions, but particularly to the east and west, making Chanute a great center for gas as well as for oil.

Erie.—Prospecting began in the vicinity of Erie about 1900, but was carried on in a somewhat desultory way until 1902. About this time a company was organized under the name of the Erie Gas and Mineral Company. In August, 1903, it reported that it had drilled 35 wells, 14 of which were gas wells, 7 oil wells, and 14 dry. The gas was piped into the city and supplied practically the entire population. During the summer of 1903 some prospecting was done in the river valley between Shaw and Erie, and, in some cases, gave very satisfactory results, but up to the date above mentioned, nowhere to the southeast of Chanute had oil or gas been found in quantity or volume at all comparable with that in the Chanute and Humboldt fields.

Moran.—The Moran Gas and Crude Oil Company began prospecting in the vicinity of Moran and soon found oil in paying quantities. The territory drilled to the close of the season of 1903 consisted almost entirely of a strip of land about 1 mile wide and 2 miles long lying immediately west of the town. Of the first 19 wells drilled, 12 produced oil, 4 produced gas, and 3 were dry.

Bronson, Elsmore, Savonburg, and Stark.—Prospecting in an irregular manner has been prosecuted to a limited extent in the eastern portion of the Iola quadrangle, particularly at Bronson, Elsmore, Savonburg, and Stark. In a few instances encouraging results were obtained, but thus far not sufficiently so to attract many prospectors away from the other areas.

PRODUCTION.

Oil.—The rapid rate of oil development in Kansas may be illustrated by the number of wells drilled. There were 725 producing oil wells at the end of June, 1903, not counting a number of unreported wells in some districts, and at the close of the year there were 1,596 producing wells, showing that a larger number of wells were drilled during the last half of 1903 than during all previous time. The subjoined table for the last half of the year covers the entire territory. It will be noticed that Chanute has the largest number, 549, and that Humboldt is second, with 339. In the territory around these two towns there is a total of 888, or considerably more than half of all reported.

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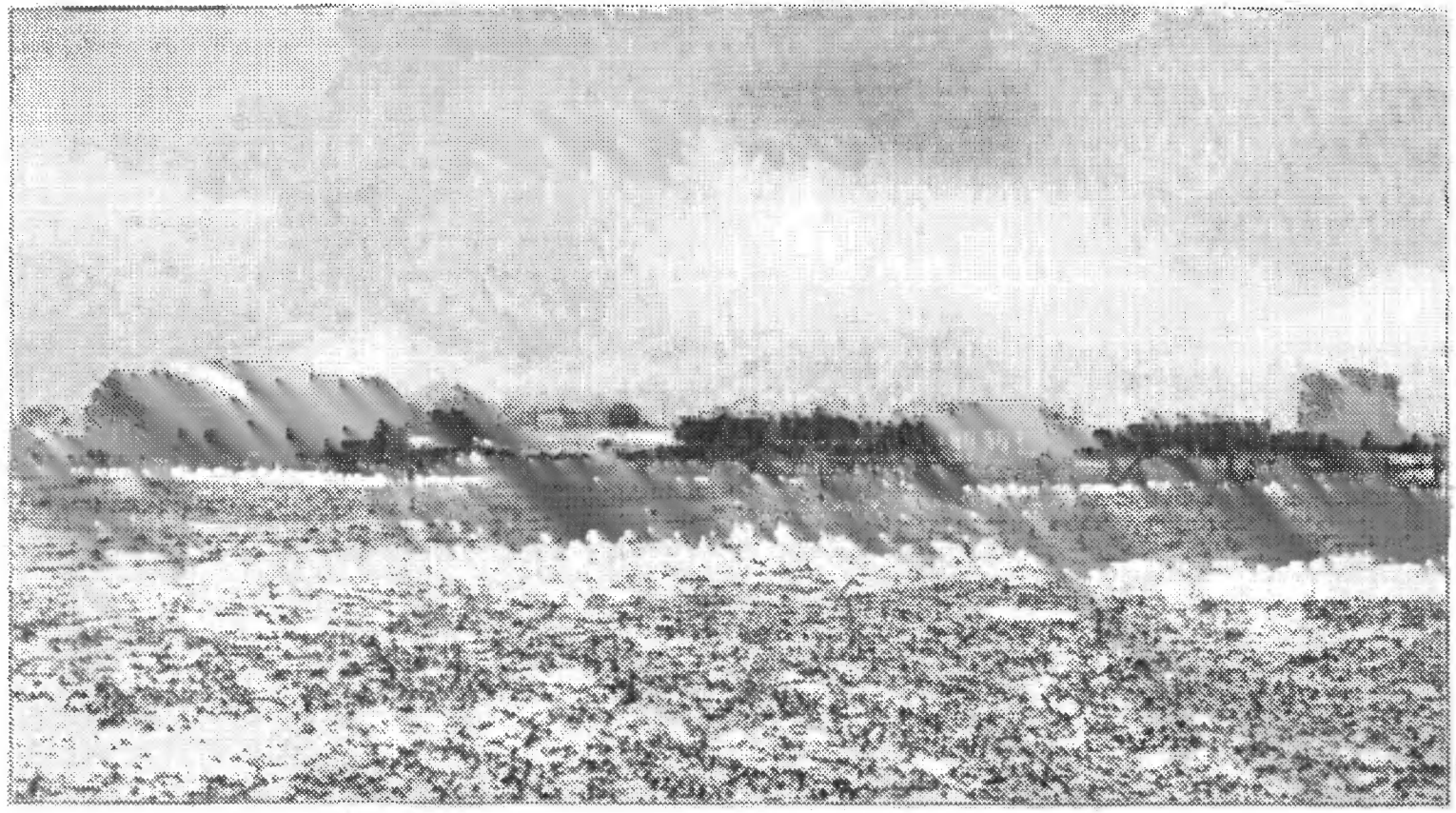

KNAPP PUMPING STATION, STORAGE TANKS, AND LOADING RACKS, CHANUTE, KANS.

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Wells drilled in Kansas, July to December, 1903.

District.	Wells producing July 1.	July.		August.		September.		October.		November.		December.		Total producing Dec. 31, 1903.
		Completed.	Abandoned.	Completed.	Abandoned.	Completed.	Abandoned.	Completed.	Abandoned.	Completed.	Abandoned.	Completed.	Abandoned.	
Chanute	306	45	0	16	0	25	0	25	1	81	2	56	2	549
Humboldt	133	14	0	35	17	65	21	68	15	44	16	65	16	339
Neodesha	161	18	5	35	12	18	5	29	9	39	2	23	10	280
Peru	32	9	1	30	10	32	11	25	4	30	1	29	3	157
Independence	7	10	7	36	18	8	4	32	11	49	10	25	6	111
Cherryvale	18	4	1	10	1	....	....	....	....	18	1	2	0	49
Bartelsville[a]	34	7	1	8	1	13	3	5	0	12	2	6	1	77
Chelsea	33	....	....	....	....	....	....	....	....	....	....	....	5	28
Red Fork	1	2	....	....	....	....	....	....	....	3	....	....	....	6
Total	725	109	15	170	59	161	44	184	40	276	34	206	43	1,596

[a] Indian Territory.

The first oil produced in the Iola quadrangle was marketed in 1900, the oil being shipped in tank cars by Mr. Knapp. He continued shipments by rail throughout 1900, 1901, and 1902, and well into 1903, since which time his production is included in the pipe-line runs given in the monthly reports by the Prairie Oil and Gas Company. Figures for the total production of oil during 1900 or 1901, are not obtainable. It is probable, however, that the two years' combined production would be about 80,000 barrels. During 1902 the production was much greater, and rapidly increased throughout 1903. In 1902 the total production at Chanute was 165,336 barrels, about two-thirds of it being produced by Mr. Knapp. By the close of 1903, however, a number of other companies were regular producers. The subjoined table, showing the monthly production of Chanute and Humboldt, includes only pipe-line runs, to which should be added the oil shipped by rail and a small amount delivered to the wagon trade at Humboldt and sold to brick plants and other manufacturers.

Humboldt produced no oil in 1902, except from one well belonging to Mr. G. Z. Work. It is estimated that he sold at least 500 barrels to the wagon trade. In 1903 this same kind of trade was continued; by June shipments by rail began; and in the late summer the pipe lines were extended to the Humboldt field and the delivery of oil increased very rapidly, as shown by the table. At the close of 1903 probably fully one-third of all the wells in the Chanute-Humboldt district were still standing idle because pipe lines had not yet reached them. The

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pipe-line runs, therefore, are only an indication of what the total production would have been had market facilities been at hand.

Shipping oil by rail was begun at Moran late in 1903, but on account of poor shipping facilities only a small amount was marketed.

Other centers of smaller production, such as Erie, Shaw, Urbana, etc., either marketed no oil or had their production included with the pipe-line runs from Chanute. Nothing was marketed from any of these points until late in the year, and since then but little, because developments were scarcely beyond the prospecting stage.

Oil production of Iola quadrangle in 1903.

[Barrels.]

	Chanute.	Humboldt.		Chanute.	Humboldt.
January	25,811.40	.....	July	34,481.65	578.00
February	26,291.60	.....	August	67,822.28	.....
March	12,812.41	.....	September	82,850.23	1,743.50
April	9,965.90	.....	October	75,141.57	6,079.70
May	46,033.57	431.00	November	74,175.44	6,743.22
June	34,494.05	144.43	December	74,182.64	6,868.22

By way of comparison, figures for the production of the entire State and adjoining points in the Indian Territory may be of interest.

Oil production of Kansas and adjoining Indian Territory in 1903.

[Barrels.]

	Chanute.	Humboldt.	Neodesha.	Peru.	Independence.	Cherryvale.	Indian Territory and Oklahoma.	Total.
January	25,811.40	.....	7,440.38	2,975.06	.....	1,154.87	7,146.76	44,528.47
February	26,291.60	.....	6,328.29	2,845.79	.....	965.15	5,697.34	42,128.17
March	12,812.41	.....	7,586.06	3,773.14	.....	1,205.76	4,126.93	29,504.30
April	9,965.90	.....	6,706.38	3,036.34	.....	425.56	7,033.88	27,168.06
May	46,033.57	431.00	9,305.74	2,634.15	.....	1,083.23	4,277.78	63,765.47
June	34,494.05	144.43	6,836.69	2,133.98	.....	922.94	8,239.81	52,771.90
July	34,481.65	578.00	6,390.50	2,133.64	.....	735.21	16,102.74	60,421.74
August	67,822.28	.....	10,858.35	3,272.90	.....	1,353.24	10,490.69	93,777.46
September	82,850.23	1,743.50	9,900.52	4,930.83	5,759.94	705.29	8,821.85	114,712.16
October	75,141.57	6,079.70	12,528.69	2,962.19	15,297.01	1,683.06	14,315.49	127,997.71
November	74,175.44	6,743.22	19,821.00	11,987.89	34,776.54	3,634.35	24,513.01	175,751.45
December	74,182.64	6,868.22	28,986.48	21,898.78	50,876.54	10,843.76	34,831.69	238,488.11

Kansas oil wells are not very strong if compared with the more noted "gushers" of America. The wells in Neosho Valley, at Chanute or at Humboldt, had an average initial production of about 20 barrels, the strongest varying from 100 to 300 barrels daily capacity and the weakest from 1 to 3 barrels.

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On the uplands to the east of the river, southeast of Humboldt and northeast of Chanute, the general character of the wells was much the same, except that a few were found which were stronger than any in the river valley. In the autumn of 1903 Martin Brothers brought in a well on the Lockhart land, sec. 13, T. 26 S., R. 18 E., which began flowing at about 1,000 barrels per day. A few weeks later the Minneapolis Oil and Gas Company brought in a well near by, likewise on the Lockhart land, which filled a 250-barrel tank in 250 minutes, a rate of about 1,440 barrels a day. These two had the greatest initial capacity of any thus far found in the State. Their rate of flow declined rapidly but remained at about 200 to 300 barrels per day for some months. In December, 1903, a few strong wells were brought in west of Chanute, just across the west boundary of the Iola quadrangle. They were much stronger than the average wells in Neosho Valley, but not equal to the wells on the Lockhart land.

Elsewhere in Kansas, outside of the Iola quadrangle, the oil wells are similar to those described. Southwest of Independence, in Montgomery County, near Bolton, during the summer and early autumn of 1903, a remarkable oil field was developed. The first good well was brought in on the Banks land, sec. 8, T. 33 N., R. 15 E. It was but a short time until a large number of wells were completed, averaging from 100 to 300 barrels per day, a great proportion of which were flowing wells. At present it seems that this is destined to be the greatest individual oil pool in the State. In the vicinity of Cherryvale good oil wells are becoming common, indicating that this also may soon be an oil center. Coffeyville also, late in 1903, became the center of active drilling operations.

Gas.—It is impossible to estimate with a high degree of accuracy the amount of gas produced in the Kansas fields. The historical sketch already given shows that gas was used in Iola as early as 1873, but pipes were not laid down for its general use until twenty years later, 1893. From that time to the present it has been used almost to the exclusion of other fuels for heating and lighting and for generating steam and producing furnace heat in the numerous manufacturing enterprises.

At Iola the manufacturing concerns are zinc smelters, brickkilns, Portland-cement factories, flouring mills, planing mills, and a number of small factories, such as are usually found in thriving young cities, including laundries, creameries, bakeries, etc. The zinc smelters of the entire Kansas gas field have produced 375,000 tons of spelter from gas furnaces, of which more than 300,000 tons were produced at Iola, Laharpe, and Gas. The gas used is the equivalent of about 2,000,000 tons of good soft coal. Kansas gas has burned about 650,000,000 brick, which would have required about 250,000 tons of coal. Of these brick about one-third were burned within the Iola quadrangle. The

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Portland-cement factory at Iola during its operation has produced, in round numbers, 2,000,000 barrels of cement, consuming gas equivalent to 200,000 tons of coal.

The consumption of gas in the lesser factories and for domestic use has been great, aggregating more than that used in the factories. The rates charged are very low. Some data have been gathered on domestic consumption, but principally in terms of the value of gas rather than its quantity. It is probable that the entire Kansas field has produced gas having a value of very nearly $5,000,000. The rates charged by gas companies in different cities vary widely, but with few exceptions the modes of estimating values are the same. A charge of so much per month is made for each light and for each of the different kinds of stoves used. The most common price is 25 cents for a light and from $1.50 to $2.50 per month for a stove. A cooking stove for a residence is charged more than a warming stove, because it is usually larger and consumes more gas. Stoves in business houses, hotels, etc., are generally larger in size than those in residences, and consequently are charged a higher rate. At Chanute the gas is owned and sold by the city and prices are fixed by city ordinance. By the terms of the city ordinance which becomes effective February 2, 1903, gas charges were reduced one-half. Accordingly, the rates now charged are: Gas jet, 10 cents per month; heating stove, $1.50 per month; cooking, $1 to $1.50 per month. For all manufacturing purposes the gas is sold by the thousand cubic feet. A concern using 1,000 or less cubic feet per month is charged 20 cents; 2,000, 35 cents; 3,000, 50 cents; 8,000, $1; 10,000, $1.25; above 10,000 the rate is 5 cents for each additional thousand. At Erie all consumers use meter rates at 25 cents per thousand cubic feet burned.

The mode of burning gas is very objectionable from the standpoint of economy. All lights are allowed to burn continuously day and night excepting in extreme hot weather, when some of the lines are turned off in order to prevent throwing too much heat into the rooms.

If good meter rates had been established throughout the entire gas region it is probable that consumers might have used all the gas they needed for their comfort in lighting and heating without consuming more than from one-third to one-half of what has actually been burned.

Gas-producing territory.—The strength of gas wells varies from wells in which so little gas is found that they have no commercial value up to those which have a capacity of more than 10,000,000 cubic feet. The best wells developed thus far are in the Iola-Laharpe region. This territory extends about 9 miles east and west and 4 miles north and south, and has supplied much more gas than any other field in the State. Other fields are known which may prove to be as good, but they have not been drawn from so extensively. The original static pressure in the Iola area was about 325 pounds per

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square inch and the best wells generally had a flowing capacity of from 5,000,000 to 10,000,000 cubic feet per day. East of Laharpe and west of Moran is a territory not yet prospected. Moran is moderately supplied with gas, but the wells are weak compared with those at Laharpe and Iola.

Very little prospecting has been done in the extreme north end of the Iola quadrangle. A few wells to the north of Carlyle have proved of little value, and likewise to the northwest of Iola. Small gas wells have been found in the western part of Bourbon County, near Bronson. About 3 miles southwest of Iola, on the Culberteon land, there are two gas wells, one of which had an initial capacity of about 3,000,000 cubic feet per day. There is a large area between Iola and Humboldt hardly touched with the drill. What little prospecting has been done has not yet yielded very encouraging results, although too few wells have been drilled to permit one to form a judgment on the territory.

Gas has been found in comparative abundance in the vicinity of Humboldt. West of Humboldt, just beyond the limits of this quadrangle, are a number of gas wells which have a capacity of from 1,000,000 to 5,000,000 cubic feet per twenty-four hours. East and southeast of Humboldt a number of other wells of similar capacity have been found, but no gas territory distinct from the oil territory has yet been developed. This field joins the gas territory in the vicinity of Chanute, with no sharp boundary line between them.

In the vicinity of Chanute gas is abundant. The first gas wells were found in Neosho River Valley, east of the town, and on the low hills in the southeastern part of the town. In fact, so many wells were found in this latter place that the name Gas Ridge was applied to it some years ago. The territory here seems to be spotted, an occasional dry hole being sometimes found with producers on either side of it. The upland lying west of the town was abandoned at one time, as the few wells drilled proved to be failures. But later other wells were drilled a little farther west and also a mile or two to the south, which proved to be good producers. During 1902 and 1903 a number of good wells were drilled in the hills on the east side of the river from 2½ to 3½ miles east of Chanute. One particularly, which was completed in July, 1903, is almost as good a well as any in the State.

The territory lying to the south of Chanute in the southeast corner of the Iola quadrangle produced but little up to the close of 1903. A few light wells have been found, particularly near Urbana and south of the quadrangle toward Thayer and Galesburg, but the prospecting is not extensive enough to show the character of this part of the field.

In the vicinity of Erie small gas wells, with a daily flowage capacity of from 100,000 to 500,000 cubic feet, are found in comparative abundance. The first 35 holes drilled by the Erie Gas and Mineral Company

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obtained 14 gas wells, 7 oilers, and 14 failures. The gas is used satisfactorily to light and heat the town.

Outside of the places mentioned but little gas has yet been found. Considerable prospecting has been done at St. Paul, but with negative results. The first well at Walnut was drilled during the autumn of 1903, and was practically a failure, showing only a very small amount of gas. Other wells are to be drilled there, but what success they will have can not be foretold. Stark, Savonburg, Elsmore, and Bayard are similarly situated. A few wells have been drilled which produce small amounts of gas, but none sufficient to be of any considerable commercial importance. Possibly future prospecting will find larger quantities of gas.

UTILIZATION OF GAS IN ZINC SMELTING.

Attracted by the cheap fuel supplied from the numerous and strong gas wells, zinc-smelting companies years ago began erecting large smelters in the Kansas gas fields. To-day more than one-half of all the spelter produced in the United States is smelted by Kansas gas, and considerably more than half of this is produced by smelters located within the Iola quadrangle.

Development of the industry.—The first smelter erected was located at Iola and built by the Robert Lanyon's Sons Company. The company began producing spelter in December, 1896, but the plant was not brought into successful operation until the spring of 1897. A large stone building erected originally for a carriage manufactory was used for furnace rooms (Pl. VIII, *B*).

As this was the first plant to use natural gas for fuel, it was largely in the nature of an experiment, and its success was watched with great interest. It was recognized from the start that the difficulty in the use of gas, should any arise, would be in the proper distribution of heat through the furnaces. It was soon found that this could be accomplished readily by providing intakes of gas, arranged in different places, as experience showed desirable. The gas was mixed with the proper amount of air by specially contrived mixers, built on the general principles of the Bunsen-burner mixer, or those so widely employed in domestic consumption of gas. The success of the company led to the enlargement of the plant from time to time, until now it has 3,200 retorts. After about a year's trial the company built another large smelter at Laharpe, which has been enlarged from time to time until it has a capacity at present of 3,440 retorts.

The success achieved by the Robert Lanyon's Sons Company soon attracted the attention of others. During the summer of 1897, W. & J. Lanyon, who were operating zinc smelters in the coal fields at Pittsburg, Kans., erected a trial smelter of 1,800 retorts at Iola, and began the production of spelter late in December of the same year. Their

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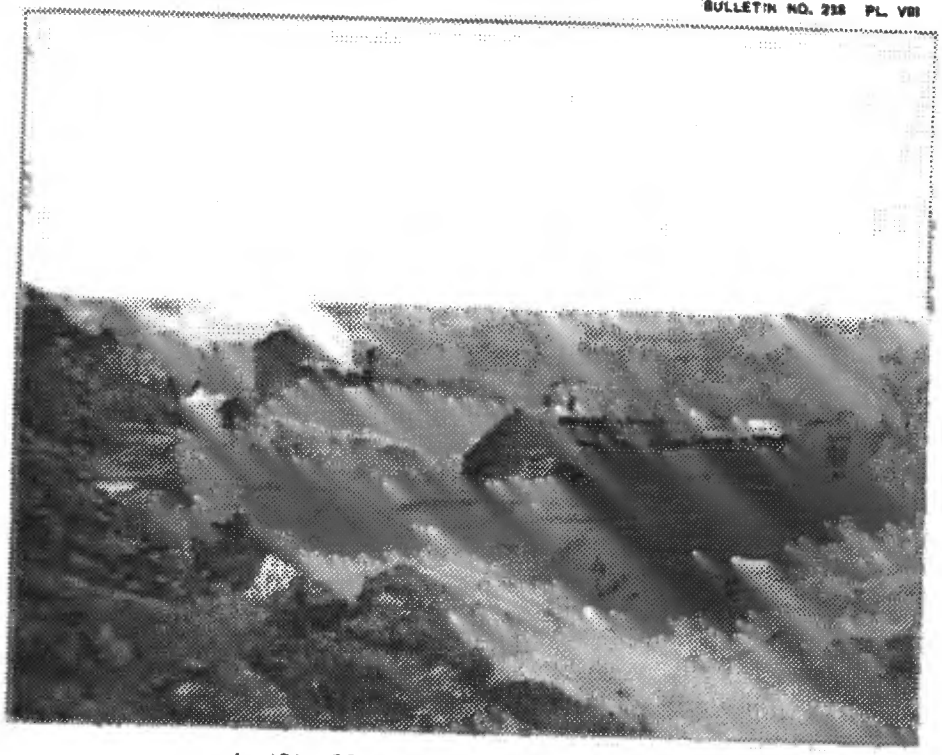
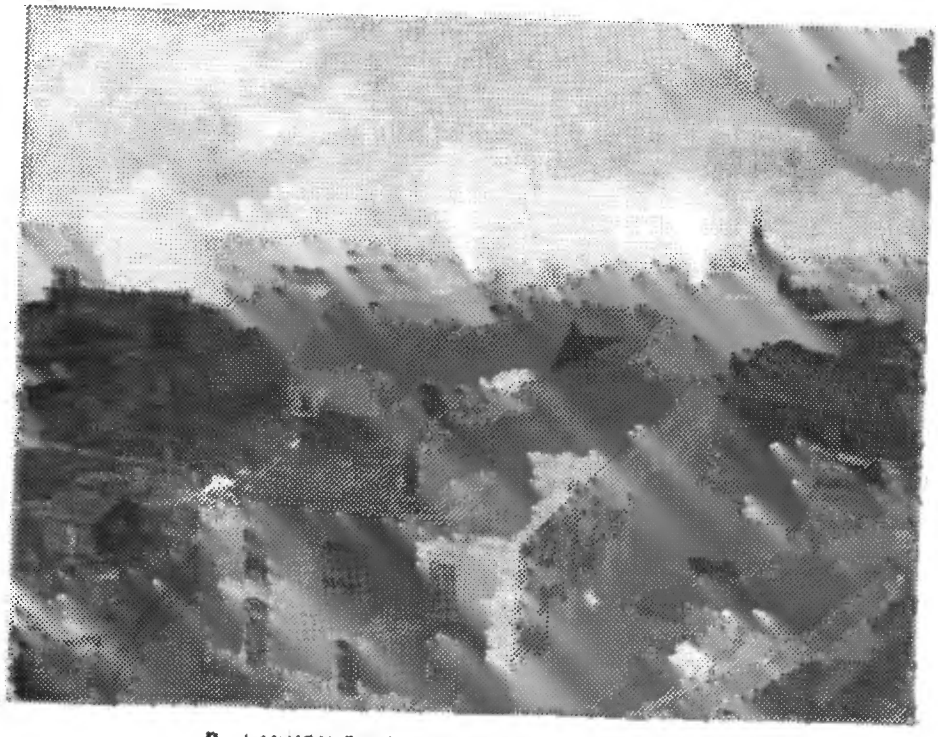


A. IOLA BRICK COMPANY'S PLANT NO. 1.



B. LANYON ZINC COMPANY'S SMELTER NO. 1.

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plant was a success from the first and was gradually enlarged until at the present time it has 3,200 retorts.

These different plants were operated separately until March, 1899. Previous to this time the Palmer Oil Company of Ohio had obtained leases on a large acreage in the vicinity of Iola and Laharpe, and had obtained a number of strong gas wells, ranging in capacity from 5,000,000 to 10,000,000 cubic feet per day. A new company was formed which bought the gas property of the Palmer Oil Company and the zinc smelters of both the firms above named, receiving the property in March, 1899, since which time all of these smelters have been operated by one management, under the firm name of the Lanyon Zinc Company. Late in 1903 they had a total of 9,840 retorts in commission.

In 1902 the Lanyon Zinc Company erected rolling mills at Laharpe, which began operations on May 3, of that year. These mills were successful in their operation and were enlarged during the summer of 1903. At the present time they have a daily capacity of from 40,000 to 50,000 pounds of finished sheet zinc.

In 1899 the Prime Western Spelter Company erected a plant of 1,240 retorts and built a little town named Gas, situated 2 or 3 miles east of Iola. The plant was owned and controlled by Mr. L. T. McRea, Mr. J. A. Daly, and Dr. L. H. Callaway. About the same time the Cherokee-Lanyon Spelter Company, of Pittsburg, erected a plant at the same place, with a capacity of 1,240 retorts. These two plants were operated successfully from the start, but later were sold. Also, in 1898, Mr. George E. Nicholson, a zinc smelter from Nevada, Mo., built a plant of 1,200 retorts capacity about 1 mile east of Iola, which was operated successfully until bought out late in 1902, having been previously enlarged to a capacity of 1,640 retorts.

In 1902 the United Zinc and Chemical Company built a zinc smelter at Iola and a sulphuric-acid factory in connection with it. The plant was completed and began operations in March, 1903. The roasting furnace is so arranged that fumes from the burning gas do not come in contact with the ore, the heat entering the roasting chamber proper by being transmitted through a fire-clay floor on which the ore rests. Air is slowly drawn over the heated sulphide ore and oxidizes it, producing a sulphur dioxide (SO_2). By regulating the draft properly and by excluding the products of combustion from the gas, a greater concentration of sulphur-dioxide vapor can be obtained than from the ordinary calcining furnace. It can thus be passed directly into the leaden acid-generating chamber.

Late in 1902 a new company was organized as the New Jersey Zinc Company. It bought the plants of George E. Nicholson and the Prime Western Spelter Company, and has since operated them as one plant. During the last summer (1903) it has been enlarging its plant to almost double its original capacity. Also, in 1903, a Mr. Braun

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began building a small smelter at Laharpe, which is expected to go into commission near the end of the year.

On account of small values of gold and silver being found in zinc ores shipped from Colorado to Kansas furnaces, it was thought desirable to put up a trial furnace for the purpose of extracting such from the residue obtained from the retorts. In 1902 the Cherokee-Lanyon Company put up such a trial smelter. They shipped ores from Colorado and from Canada known to have small gold and silver values and extracted the precious metals from the retort residues. After a trial of about a year they abandoned the enterprise and permanently closed down their gold and silver smelter, finding that the expense was greater than the profit.

At the present time, summarizing the above data, there are in operation in the Iola quadrangle zinc smelters belonging to four different companies, with an aggregate capacity of about 17,000 retorts, not including the ones at Laharpe, which are not yet completed.

Method of smelting.—Zinc smelting with gas for fuel is conducted very similarly to zinc smelting with coal. Kansas smelters use almost exclusively ore from the Joplin-Galena mining district, which supplies zinc blende or zinc sulphide. Such ores, after being properly pulverized, are passed through the roasting or calcining furnace. Here the gas flame, mixed with an excess of air, comes in direct contact with the ore. The sulphur is gradually expelled as sulphur dioxide (SO_2), leaving the zinc in the form of zinc oxide (ZnO). From the calcining furnace the zinc oxide is taken to the retort or sublimation furnace, mixed with the proper amount of carbon, and placed in externally heated fire-clay retorts. These retorts, which are circular in cross section, 4 feet long and about 10 inches internal diameter, are arranged in the furnace so that they form a series of rows one upon the other, each retort being almost horizontal. The back or inner edge is closed in the making, but the outer end, which projects slightly through the wall of the furnace, is left open. After the charge is put into the retort a conical, hollow, fire-clay condenser is put into the open end of the retort. This gathers the vapor of metallic zinc volatilized by the heat of the furnace and holds it until enough has condensed to be drawn off. As this condenser is entirely outside the furnace its temperature is below the point of volatilization and above that of solidification and consequently serves the purpose well. The bulk of the carbon, which is mixed with the zinc oxide before it is put into the retorts, is in the form of coke made principally from slack coal obtained from the coal mines in Cherokee and Crawford counties. With this coke a small or varying amount of pulverized anthracite is used, to which is added a small proportion of pulverized bituminous coal, the whole charge being thoroughly mixed together. The retort is completely filled, after which an iron rod about 1 inch in diameter is

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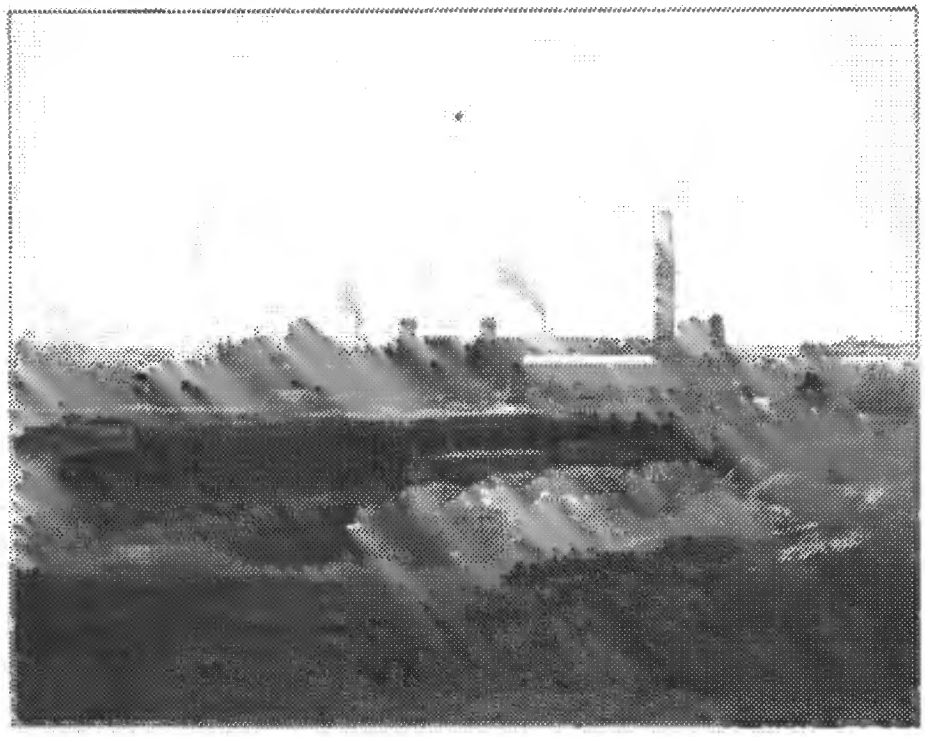
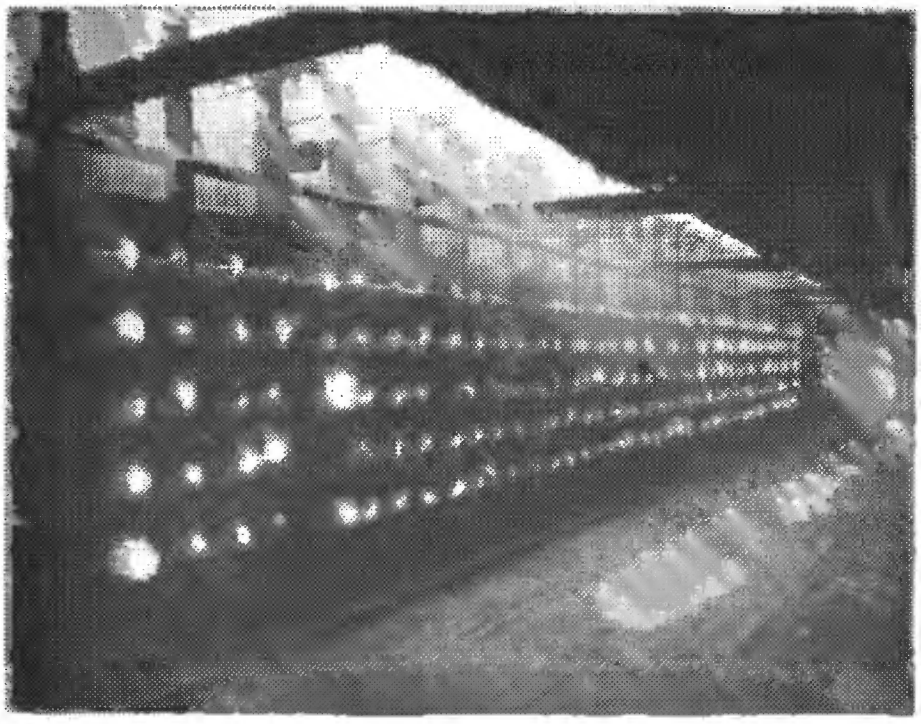


A. LANYON ZINC COMPANY'S SMELTER NO. 2.



B. BANK OF RETORTS SHOWING FLAMES AND ZINC FUMES ESCAPING FROM THE ENDS OF CONDENSERS.

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forced into the top part of the charge through the entire length of the retort to make a little opening, along which the first volatile material may pass when the smelting has begun. The conical condenser is then inserted and the heat of the furnace soon causes chemical action to begin. The bituminous coal is added in order to produce a little volatilization early in the process. As the gas thus formed passes out of the retort it sets up to some extent an outward current. When the hot carbon reduces zinc oxide to metallic zinc the latter is immediately volatilized and driven over into the condenser. The carbon unites with the oxygen of zinc, producing a small amount of carbon dioxide (CO_2), but principally carbon monoxide (CO), a combustible gas that is set on fire at the outer end of the condenser. The small flame thus produced is colored slightly by traces of zinc vapor and other materials which may be in the ore, particularly cadmium, should any be present. The operator judges the temperature of the furnace and the rate of progress largely by the color of the flame, which varies from time to time with varying conditions of temperature and progress of reduction.

Production of spelter in 1902.—A retort, such as has been described above, produces from 23 to 25 pounds of metallic zinc for each charge, the amount varying slightly with the grade of the ore, but rarely exceeding these limits. It takes twenty-four hours to dispose of one charge, so the capacity of a furnace is obtained by allowing about 24 pounds of spelter per day for each retort. There are 17,000 retorts in the smelters in the Iola quadrangle at the present time. If no allowances were made for shut downs for repairs and other necessary stoppages, they would be able to produce nearly 75,000 tons of spelter per annum, an amount almost as great as the total State production for 1902. The difference between the figures obtained in this way and the actual amount of production is due to a number of causes, the principal one being that no furnace can be operated continuously year after year without repairs. It is quite unusual to find a large smelting plant with all of its furnaces in commission. Almost always one or more of them will be closed for repairs, or for some other temporary cause.

In 1902 the furnaces above described produced about 66,000 tons of spelter which, at the New York quotations, had a value of $6,201,600.

PHENOMENA OF GAS WELLS.

By GEORGE I. ADAMS.

When, in the operation of drilling, a reservoir of gas is encountered, its presence is immediately known by the fact that it flows from the well. As the drill goes deeper the volume of gas increases until it reaches the maximum production. In many instances the force of the gas assists in opening the reservoir by blowing out fragments of rock, and the well is said to "drill itself in." If the gas is under high pressure the force may be great enough to lift the drilling tools out of

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the well. The task of confining the gas is by no means an easy one. Sometimes the pressure causes the casing to rise out of the ground and it is necessary to secure it by means of anchors. If there are defects in the casing or valves they may break as a result of the pressure when an attempt is made to close the well. The sound made by the issuing gas is often deafening, and if the gas is ignited the flame causes a roar which may be heard for miles. To those who are at work around the well the effect is sometimes nauseating and otherwise disagreeable, and it is necessary to protect one's ears or permanent deafness may result.

The phenomena connected with the occurrence of natural gas, although now fairly well understood, are in a way mysterious and elusive. The first exploitation of gas began in the early seventies in Pennsylvania. Although but a short time has elapsed since then, the laws governing the utilization of gas are well understood by many operators. For the information of those who are interested in the occurrence of gas or who may wish to engage in prospecting, it is proposed here to review certain of the phenomena of gas wells.

For a proper understanding of the laws which govern the flow and pressure of gas it may be well first to explain the nature of a gaseous body. In a gas the molecules are separated beyond the limits of cohesive attraction so that they are free of all restriction upon one another. It is not known if there is a limit to the rarefaction of gases when they are unconfined; that is, at what distance the attraction of the molecules for each other would just balance the mutual repulsion. Gas may be said to fill a reservoir no matter how small the amount may be.

Natural gas, as it is commonly called, is a mixture of several gases, of which marsh gas (CH_4) is found in the Kansas product to constitute from 92 to 98 per cent. The following table[a] shows the composition of gas found at various localities in the Kansas field:

Composition of natural gas found in the Kansas field.

	Paola.	Osawatomie.	Iola.	Cherryvale.	Coffeyville.	Independence.	Neodosha.
Carbon dioxide	0.33	0.22	0.90	0.22	0.00	0.44	1.00
Olefiant gas, etc.	.11	.22	.00	.00	.35	.67	.22
Oxygen	.45	Tr.	.45	.22	.12	Tr.	.65
Carbon monoxide	.57	1.33	1.23	1.16	.91	.33	.50
Marsh gas	95.20	97.63	89.56	92.46	96.41	95.28	90.56
Nitrogen	2.34	.60	7.76	5.94	2.21	2.28	7.07
Hydrogen	.00	.00	.00	.00	.00	.00	.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

[a] Bailey, E. H. S., Kansas Univ. Quart., vol. 4, No. 1, July, 1896, p. 10.

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Gas diffuses readily and when it issues from the well immediately becomes mixed with air. When it is used as fuel the necessary oxygen from the air is added to it by means of a mixer, which allows the diffusion of the air and gas to take place before it is burned. Gas is absorbed by water and oil, the amount absorbed depending upon the pressure and temperature. As an aid to the understanding of the relations of gas absorbed in a liquid ordinary carbonated water may be cited. When gases are once formed they are very stable and retain their condition excepting under very high pressure and low temperature. The degree of compression or density of gas is dependent upon the heat and pressure to which it is subjected. Gas expands against any constant pressure by one four hundred and ninety-first part of its volume for every degree Fahrenheit by which its temperature is raised. At a fixed temperature the volume of a body of gas decreases or increases at exactly the same rate that the pressure increases or decreases. The expansive force of gas is exerted in all directions and the pressure on confined bodies is transmitted undiminished.

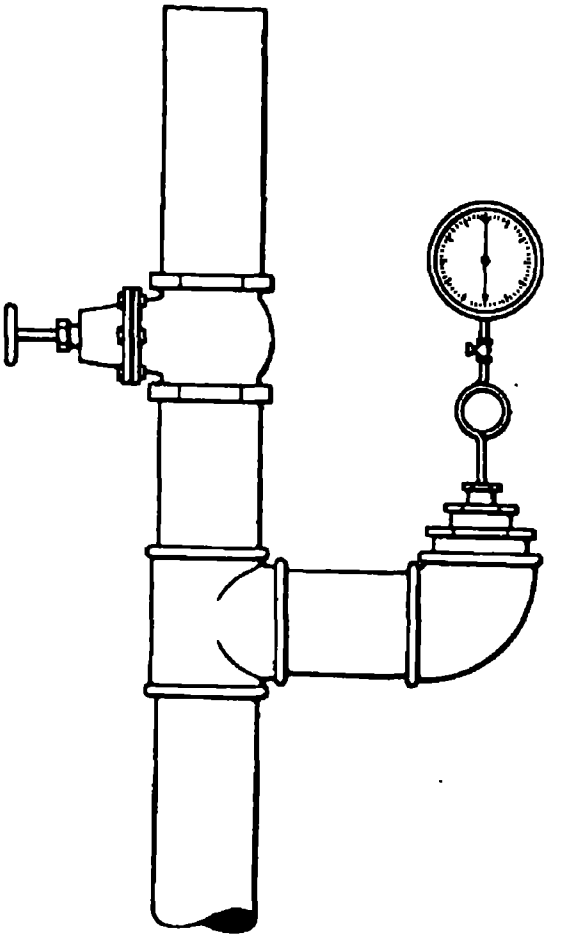

FIG. 4.—Spring gage attached for measuring static pressure.

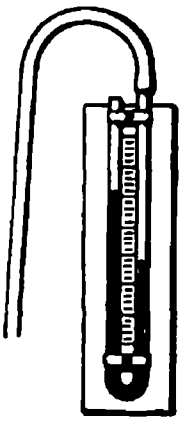

FIG. 5.—U-shaped gage with flexible hose for attachment in measuring gas pressures.

Static or closed pressure.—A body of gas confined within the earth, if not subjected to geologic changes, remains in a quiescent state until reached by the drill. A well forms an artificial extension of the body of gas and affords an opportunity to measure its degree of condensation. When the pressure in a closed well is moderately high it may be measured by connecting a spring gage with the casing (fig. 4). The gage records the pressure in the same way as does a steam gage on a boiler. If the pressure is small a U-shaped tube (fig. 5), contain-

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ing mercury, water, or other liquid, may be connected with the casing and the pressure registered by the height to which the column of liquid rises. The U-shaped gage, because of the nature of the instrument, can be used only for low pressures.

While a measurement so taken is commonly stated to be the pressure of the gas in the well, the fact should not be lost sight of that it is the measure of the pressure exerted by the gas on all parts of the reservoir of which the well is an artificial prolongation. The static pressure recorded when a well is first brought in is commonly spoken of as its initial pressure. Any variations which are recorded in subsequent measurements are found to be lower. For example, if, after a well is measured, it is allowed to blow off and is then suddenly closed the pressure on the gage will be lower than it was before the valve was opened, the reduction being caused by the friction encountered in flowing. However, the index on the dial of the gage will gradually change its position, indicating a higher pressure and in the course of a short period will record the same pressure as was just previously noted.

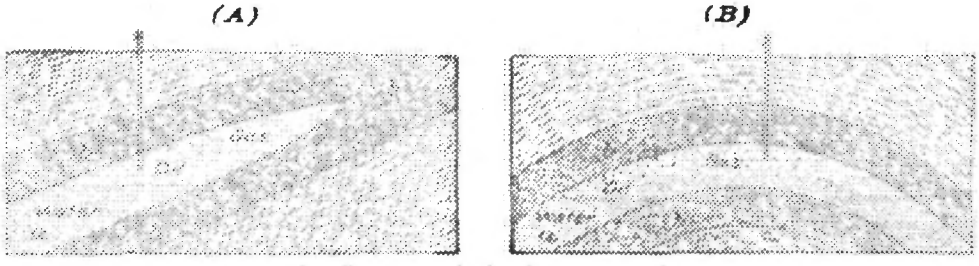

FIG. 6.—Types of oil and gas reservoirs.

A, inclined bed of sandstone (*a*) sealed in by shales (*b*), but somewhere in communication with water under hydrostatic pressure.

B, sandstone bed (*a*) interstratified with impervious beds (*b*) and forming an arch or anticline, and somewhere in connection with water under hydrostatic pressure.

In the Kansas field a pressure of 325 pounds to the square inch is not unusual. Many wells show a lower pressure, and some are reported to reach 600 pounds. The force of the gas issuing from a well as computed in horsepower reaches a surprising figure, being so great that the gas may be turned directly into the cylinder of a steam engine and its expansion utilized as a source of power. High pressures in the field are desirable since they enable the gas to be conveyed long distances through ramifying pipe lines, where the friction which must be overcome is a serious element.

After a well has produced for a considerable period of time the pressure will be found to have fallen off. This is the history of the wells in all fields. The fact may be taken as an indication that the exhausting of the gas changes the relations in the reservoir. The gas confined within the earth occupies the interstitial spaces in sandstones and porous rocks. A gas reservoir accordingly is a complex series of openings. Its limits are the impervious rocks which inclose

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its upper surface and the water or oil which lies below it. The two types of reservoir considered from the standpoint of the structure of the rocks are shown in the accompanying figure (fig. 6).

The degree of density of gas under hydrostatic conditions in a reservoir depends upon the pressure exerted upon it by the oil and the water. The amount of this pressure is due to the hydrostatic head. If the place of intake of the water is known and it is assumed that the water-bearing stratum is completely saturated, the pressure of the gas can be computed by measuring the height of the column of water acting on it. The observed pressure in closed wells is found to check closely with the results obtained where these factors are known. A simple example illustrating the hydrostatic head is shown in the accompanying diagram of an artesian well (fig. 7).

The fact that a well shows a high pressure is evidence of the relative density of the body of gas, but it does not indicate the capacity of the reservoir. If the hydrostatic conditions are perfect the pressure of the gas will be very nearly maintained throughout the life of the well whether the reservoir is large or small, the difference in pressure being due simply to change in the level of the water.

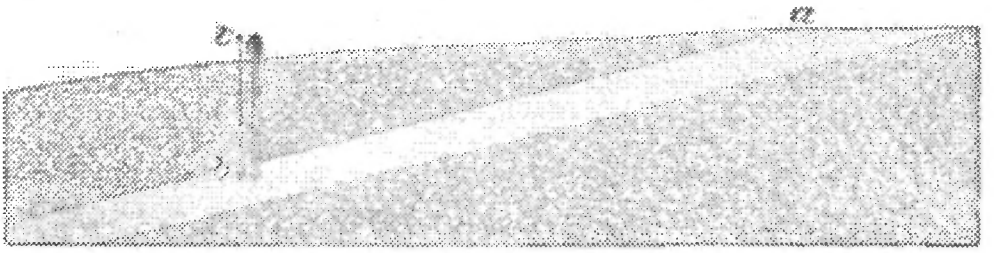

FIG. 7.—Diagram of an artesian well: *a*, point of intake; *b-c*, height of column of water exerting hydrostatic pressure at *b*.

As the gas in the reservoir is reduced in quantity by flowing out of the well the water or oil limiting its lower surface rises. The amount of decrease in pressure may be measured by subtracting the weight of a column of water or oil having a height equal to the difference in its original and subsequent levels. Inasmuch as the movement of water in the earth's crust is much retarded by friction, and in some cases may be modified by changes in porosity of the strata owing to cementation of the rocks after the gas has accumulated, the observations on wells show variations from ideal conditions.

Dynamic or open-flow pressure.—In flowing through a well casing gas encounters the resistance of friction, which is relatively large in small pipes. The dynamic or open-flow pressure at the mouth of the well is equal to the static or closed pressure minus the friction. As will appear later in this discussion, the velocity of the flow bears a fixed relation to this pressure.

In all measurements under ordinary conditions atmospheric pressure is a factor. It may, however, be neglected, since the apparatus used

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is so constructed that atmospheric pressure on the gas is balanced by atmospheric pressure on the opposite side of the diaphragm in spring gages or of the column of liquid in U-shaped tube gages. The measurements recorded are accordingly for gas under pressure of one atmosphere. The weight of a column of air at sea level is about 14.7 pounds per square inch. Corrections for altitude may be made by reference to barometric readings, but in ordinary work are usually neglected. In accurate measurements of volume corrections for temperature are made. The volume of flowing gas is computed at 40° F., and for gas in a reservoir a temperature of 50° F. is taken as the standard. The specific gravity of natural gas is about six-tenths, air being considered as one. Corrections for exact specific gravity of gas may also be made if desirable.

The volume of gas flowing from a well or through a pipe is expressed

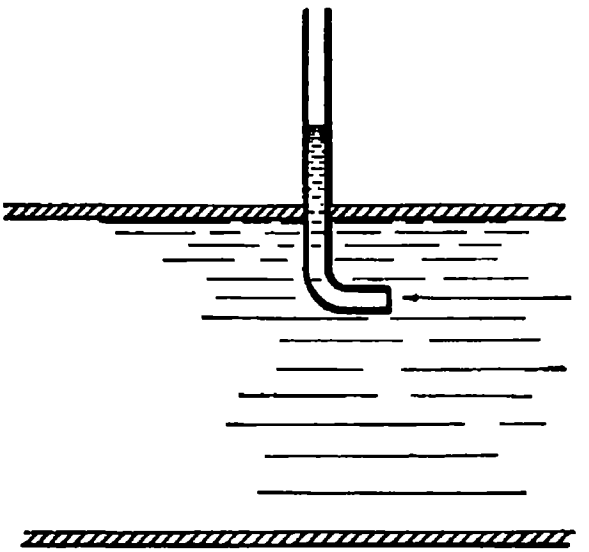

FIG. 8.—Simple form of Pitot tube.

in cubic feet. When a measurement is made, the size of the inside diameter of the pipe should be stated. This is because the carrying capacity of pipes varies as a square root of the fifth power (that is, as a 2.5 power) of the diameter, and although there is an increase in the velocity of flow with a decrease in size of the pipe, this does not entirely compensate for the increased friction. The tables commonly used in computing volumes are apt to be misleading if this fact is not borne in mind, for in measuring the volume, the well tubing is usually reduced to a 2-inch nipple. If it is desirable to determine the full capacity of a well, measurements should be made in the tubing.

As a result of friction currents the velocity of flow is not uniform over all parts of the area of a well opening. Experiments have shown that the points of mean velocity are about midway between the center and the circumference of the casing. In measuring the volume of gas issuing, it is necessary to determine its velocity and compute the

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amount for the size of the pipe. For measuring the velocity, the Pitot tube is employed.[a]

The simplest form of this instrument is shown in fig. 8, in which the velocity of flowing water is shown to cause a rise of head in the tube. In accordance with the laws of physics (and as may be found by experiments) the height of the column is doubled when the velocity is squared.

The velocity of gas flowing from a well may also be determined by means of a spring gage in accordance with the following facts: The pressure required to drive a unit amount of gas through an opening must be increased fourfold for twice the amount of gas, since double the amount must pass in a given time and the unit amount must move with double the speed. Inasmuch as the density of the gas at the level of the casing is constant, being that produced by atmospheric pressure, the relative velocity may be determined by measuring the pressure, and is found to be doubled when the pressure is four times as great. The method of using a spring gage is illustrated in fig. 9.

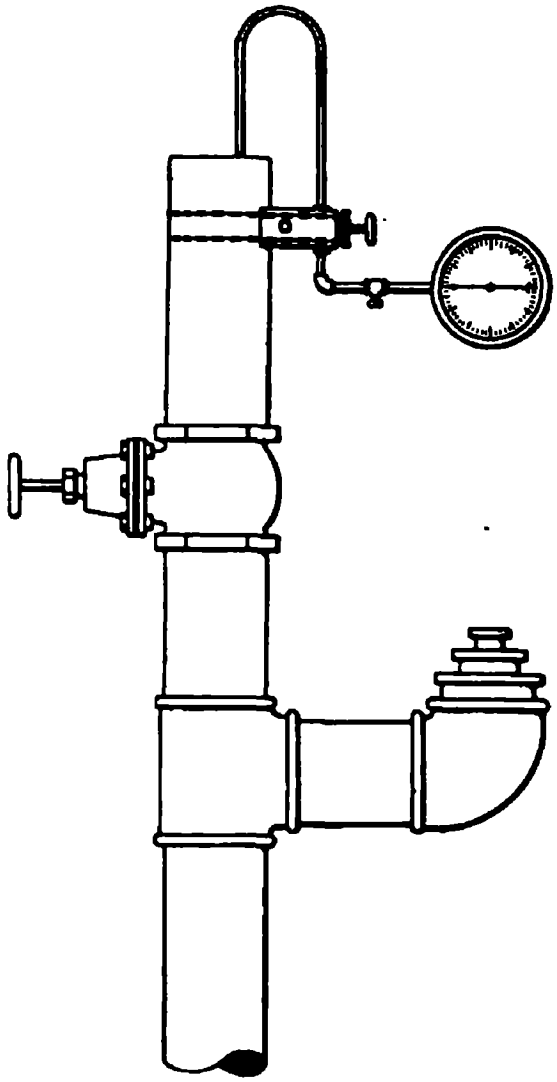

FIG. 9.—Pitot tube and spring gage attached for measuring velocity of gas issuing from a well.

Actual measurements may be made by means of volumetric meters. Such will furnish the basis for computing volumes by means of velocity and pressure, and will show that they check very closely with the volumes computed from observations made with gages. A table, known as the Robinson table, in common use for computing the discharge of gas wells, is inserted here for reference.

[a] This instrument takes its name from the inventor, Pitot, who made it known to the French Academy of Sciences in 1732. Its adaptability for measuring the flow of gas was demonstrated by Prof. S. W. Robinson of the Ohio State University, who, by careful experimental tests, proved that the results obtained by it agree with the theoretical ones, while the instrument may be either fine or rude in construction. See Van Nostrand's Engineering Magazine, vol. 18; Geol. Survey Ohio, vol. 6, 1888; and First Ann. Rept. Geol. Survey, Ohio, 1890.

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Pressure and flow in pipes.—The volume of gas flowing through a pipe at any point may be measured by determining the velocity and internal pressure of the gas. The Pitot tube is adapted to this use, and can be inserted into the flowing gas at the point of average velocity by drilling a hole in the pipe and making tight connection (fig. 10). The reading on the gage will be the pressure due to velocity plus the internal pressure. The internal pressure, which must be substracted

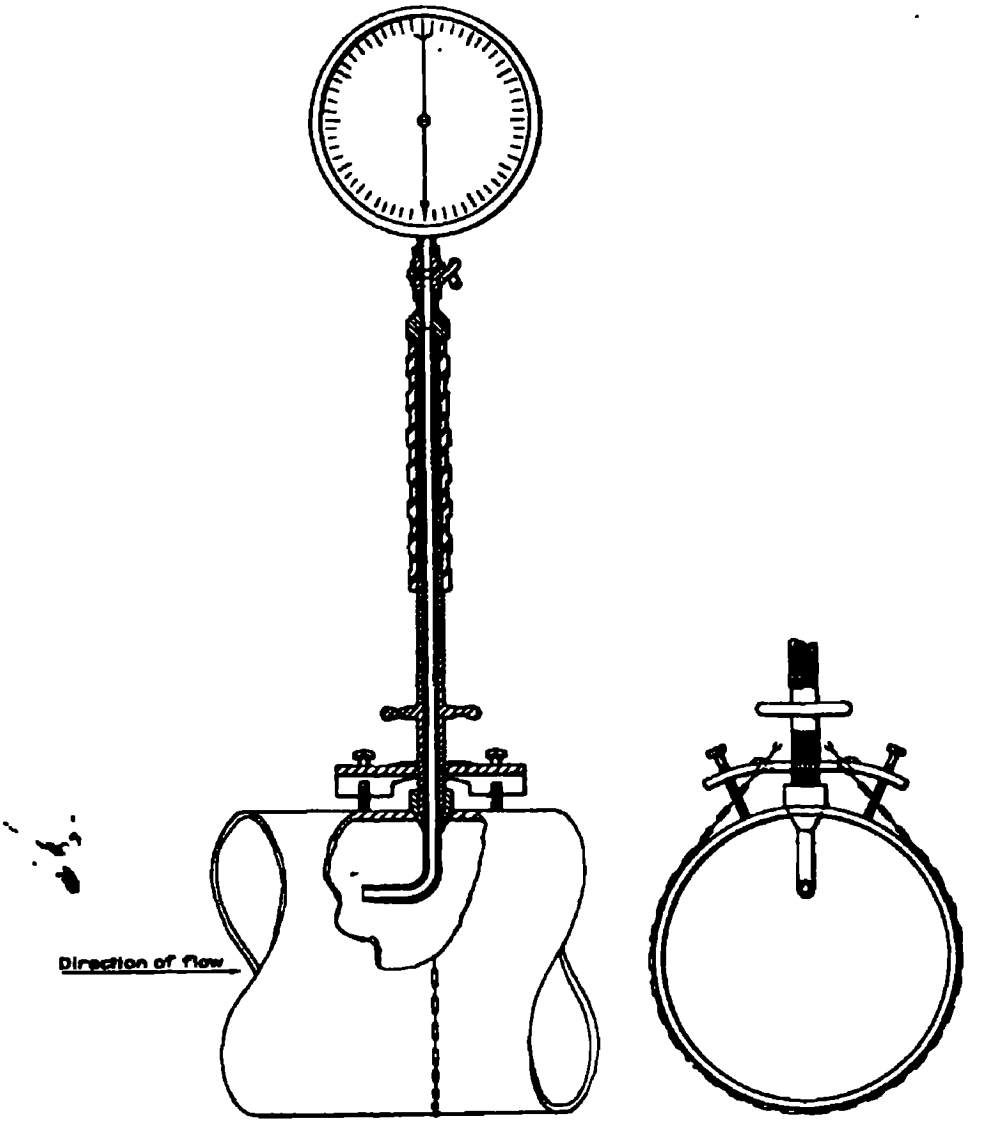

FIG. 10.—Pitot tube and spring gage, attached for measuring velocity of flow of gas in a pipe.

in order to determine the pressure due to velocity, can be measured by connecting a spring gage or U-shaped tube in a similar manner, but so arranged that it records only the pressure transmitted laterally (see fig. 11). If the apparatus is arranged as in fig. 12, the reading on the gage will be the difference of the two, or the pressure due to velocity of flow. This form of instrument is known as the Robinson instrument. It may be used with spring gages, or, by detaching the

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3,000	11,844,000	14,990,000	17,055,000
9,000	12,246,000	15,499,000	17,634,000
5,000	12,648,000	16,008,000	18,213,000
1,000	13,050,000	16,517,000	18,792,000
6,000	13,462,000	17,038,000	19,386,000
8,000	14,147,000	17,905,000	20,371,000
3,000	14,372,000	18,645,000	21,214,000
5,000	15,833,000	20,040,000	22,800,000
9,000	16,875,000	21,357,000	24,300,000
9,000	17,839,000	22,577,000	25,688,000
0,000	18,716,000	23,977,000	26,951,000
2,000	19,484,000	24,659,000	28,057,000
4,000	21,129,000	26,741,000	30,425,000
9,000	22,555,000	28,894,000	32,478,000
5,000	23,870,000	30,211,000	34,373,000
3,000	24,967,000	31,599,000	35,952,000
3,000	25,918,000	32,802,000	37,321,000
8,000	26,800,000	33,919,000	38,592,000
4,000	27,672,000	35,023,000	39,848,000
6,000	28,440,000	36,000,000	40,953,000

[redacted]

', 244	7, 8
', 936	8, 6
), 164	9, 9
), 248	11, 1
:, 226	12, 2
2, 580	13, 6
4, 490	15, 7
3, 200	17, 6
', 750	19, 2
), 492	22, 2
2, 910	24, 9
5, 098	27, 2
', 109	29, 4
1, 980	31, 5
), 735	33, 4
2, 402	35, 2
1, 980	36, 9

10
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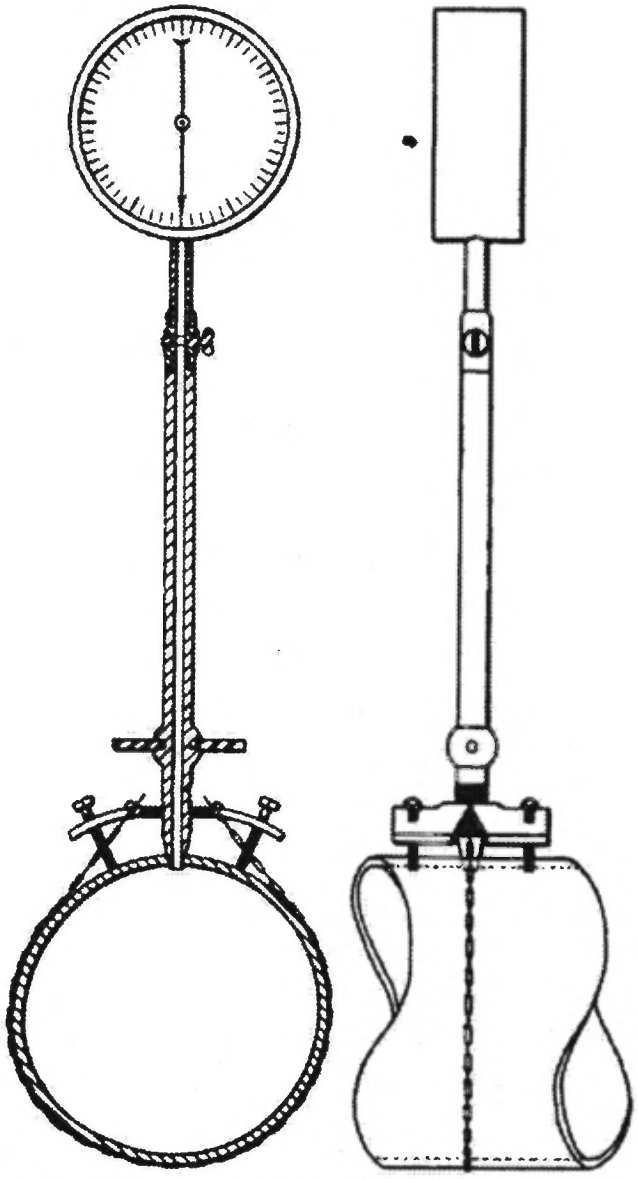

FIG. 11.—Spring gage attached for measuring internal pressure of gas flowing in a pipe.

spring gage and filling the U-shaped tube in the center of the instrument, may be used as a mercury or water gage. Separate readings of static and flow pressure may be made by closing the valves at the top of the instrument. Tables for avoiding the necessity of computation have been prepared by Professor Robinson for various sized pipes. Corrections may be made in these for difference in specific gravity and temperature.

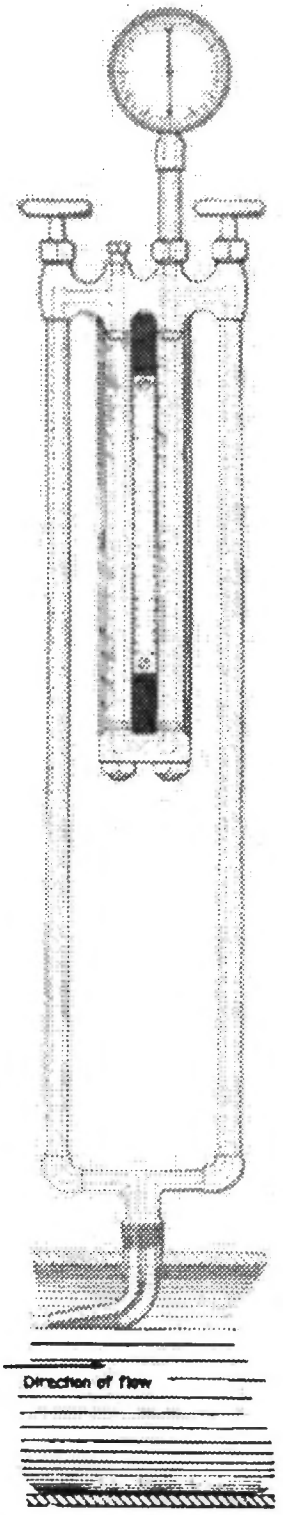

FIG. 12.—Robinson instrument for measuring velocity and pressure of gas flowing in pipes.

Minute pressure, or measurement of volume by number of condensations.—If gas is allowed to flow into a reservoir of known capacity the

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amount which enters may be computed from the increase in internal pressure which accompanies increased density. The casing of a well affords opportunity for similar measurements. If a well is allowed to blow off and is then suddenly closed and the reading of the pressure gage is taken, the density of the gas in the casing at that instant may be determined. If the gage is watched the indicator will show a gradually higher pressure. If this is recorded at the end of a minute the amount of gas which has entered the well casing during that time may be computed by means of the difference in density, the volume of the casing being a readily determinable factor.

In measuring the volume of a well by this method a short piece of tube is attached to the well casing in the same manner as if the static pressure were to be taken, but is so arranged that the well can be blown off. To this tubing a spring or U gage is attached. After the well has been blown off and the index of the gage is stationary the pressure is read and recorded. The control valve is then immediately closed and the time noted. At the end of a minute the pressure on the gage is read and recorded. It will be found to be higher as the result of the compression of the gas in the casing. The difference in pressure is multiplied by the volume of the well tubing in cubic feet and by 0.07 (the constant employed in calculating the number of compressions), and this product is the volume in cubic feet per minute. This quantity multiplied by 60 and 24 gives the volume of production for a day.

This method of measuring the volume of a gas well is the most convenient one yet devised, but although valuable as indicating the relative production which is possible from wells, it should not be considered as accurate.

For computing the volume of a well casing the following table will be found convenient:

Table of diameters in inches, and of contents in cubic feet, for 1 foot of length of well casing.

Diameter in inches.	Cubic feet for 1-foot length.	Diameter in inches.	Cubic feet for 1-foot length.
1	0.0055	6	0.1963
2	0.0219	8	0.3491
3	0.0491	10	0.5454
4	0.0873	12	0.7854
5	0.1364		

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OBSERVATIONS AND MEASUREMENTS OF GAS WELLS.

By W. R CRANE.

Measurements of static, or closed, pressure.—The usual method of taking the closed or static pressure of a well when it is free from connecting tubes is to reduce the 2- or 3-inch valve opening by bushings and plugs to a size that will permit the attachment of a pressure gage (see fig. 4). Connection is usually made by a short section of quarter-inch pipe, either straight or formed into a loop such as is commonly known as a steam siphon. If there is a T in the casing below the control valve a lateral pipe valve and elbow will afford a convenient attachment for the gage. Sometimes a hole is drilled into the well tubing a few inches below the control valve, and is threaded, and a short piece of pipe with a valve and a gage connection screwed in. The last two forms of connection are especially convenient where measurements are taken frequently, since they may be left ready for the attachment of the gage. When a gage is attached to a well the joints should be tight. The valve leading to the gage should be opened slowly to prevent too sudden pressure being thrown on the gage. The pressure of the gas will cause the indicator to move until it records a maximum at which it will remain stationary. If the well has not been blown off this pressure will be reached as soon as the valves are fully opened. In case it has been blown off some time will be required for the gas to build up to maximum pressure. Before attempting to remove the gage the valves should be carefully closed. Since there is a wide range of pressures in gas wells, the observer is usually provided with several gages from which he selects one capable of recording the pressure found.

The record of the static pressure in a well is sometimes incorrectly interpreted as indicating the volume of a well. The relation between pressure and volume of flow is variable, and accordingly measurements of flow should be made when the capacity is to be estimated. The observations of static pressure which were taken in the Iola quadrangle were largely for the purpose of determining the hydrostatic conditions in the field and have been of great value in determining the structural relations of the gas-bearing strata.

In studying the hydrostatic conditions of a field it is desirable to learn the initial pressures of wells since they furnish data for estimating the head of water which is pressing upon the gas in a reservoir. When a well is drilled into a sand which has already been tapped by other wells the pressure which it shows is apt to be below that of the first well, since the using of the gas changes the relations in the reservoir. The initial pressures for different parts of the field were obtained from parties who had made observations at the beginning of

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developments. Some of the pressures have been recorded in published reports or are on record in notes of men who work in the field. The writer measured the pressure in wells in new parts of the field; some of his figures may be regarded as those of initial pressures, since the gas pools had not been drawn upon.

The pressure in the Iola quadrangle varies with the depth of the wells; in round numbers it is 330, 290, 270, and 230 pounds for wells varying in depth between 900–950, 800–900, 700–800, and 600–700 feet, respectively. These figures agree remarkably well with the range of pressures taken throughout the entire field.

As a means of checking the pressure due to hydrostatic head in gas wells, some measurements were made from wells which produce oil. In these cases the pressure recorded was due to the compression of air and gas on top of the oil column when the well was closed. To the pressure shown by the gage was added the weight of a column of oil 1 square inch in section and equal in height to the depth of the oil in the well. An average of a number of measurements made on a group of oil wells showed a pressure of 7.3 pounds on the gage. In estimating the weight of the oil in the well the weight of a column 1 square inch in section and 1 foot high was taken at 0.348 pounds. The total column of oil in the wells in question was 799 feet, equal to 278.4 pounds. The observed pressure of 7.37 pounds added to this gives a total of 285.77 pounds as the hydrostatic pressure in the well. The hydrostatic pressure in gas wells close by which have the same depth was found to be 286.7 pounds. This shows a close correspondence, the difference being about 1 pound. Similar results have been obtained by other observers.

In parts of the field which have been drawn upon very largely the static pressure of wells is generally known to have fallen off. Data obtained during the progress of field work, compared with records made by the writer the previous summer and with the records of other observers, show the decrease to be gradual. Where the wells have been in use for a long time the pressure has been diminished until the consequent production is small, and in some cases the wells have been abandoned. Any notable decrease of static pressure is occasion for alarm as to the continuance of production from a given reservoir. The accompanying table, extending over a considerable period of time, has been prepared from observations on certain wells in the Iola quadrangle.

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Table showing decrease of static pressure in certain wells in a part of the Iola field where the consumption is very great.

No. of well.	1900.		1901.			1902.			1903.		
	Sept.	Dec.	Apr.	Aug.	Dec.	Apr.	Aug.	Dec.	Apr.	Aug.	Dec.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1	280	235	190	200	150	85	95	130	100	55	.....
2	249	222	185	170	165	130	150	75	65	60	.....
3	233	180	187	177	130	145	127	100	85	70	.....
4	.....	154	150	135	110	122	110	40	2.5	1.5	.....
5	.....	151	Off.	120	110	86	45	40	Off.	.....	.....

The initial static pressures, as well as those judged to be somewhat below the initial, obtained from the gas wells in the Iola quadrangle, were platted upon a map, whence it appeared that the low pressures are in the eastern portion of the field and the high pressures in the western. Moreover, zones of equal or of given variation in pressure can be outlined. In the map (fig. 13) zones in which the pressure varies from 140 to 200 pounds, from 200 to 300, and 300 to 330 pounds, are shown. From a consideration of the structure of the field and these zones of pressure the following deductions may be drawn:

1. The trend of the zone is approximately parallel with the strike of the rocks.

2. The pressure increases westward with the dip of the rocks and the static pressure in the wells varies directly with the distance from the outcrop of the gas-bearing formation.

3. The variation of pressure is greatest in pools farthest from the outcrop.

Measurement of the volume of gas wells.—An approximate estimate of the capacity of a gas well can be formed from the sound which the gas makes when it flows into the air. An experienced observer can come within 10,000 to 15,000 cubic feet of the total capacity, but is liable to make a wider error, especially if there are irregularities in the tubing or in the valve which affect the sound. Inasmuch as wells are sold on their purported capacities great care should be exercised in order to guard against misrepresentations. The most accurate method of measuring a well is by means of the Pitot tube (fig. 9). The essential part of this instrument is a U-shaped tube either in a continuous piece or formed by joining straight pieces of pipe by means of elbows. When a tube is made of straight pieces it can be taken apart and cleaned. This is a decided advantage, especially where wells are throwing shale or mud which may clog up the tube. The instrument is attached to a block or saddle which in turn is fastened by means of chains at the top of the well casing. It should be placed at

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a distance from the control valve. The tube must be free to rotate in the saddle and should be so arranged that it can be adjusted to various sized pipes and brought to any required position over the mouth of the well. When a measurement is made the tube is clamped in the desired position by means of a set screw.

Various devices are employed for attaching the instrument. When a wooden block is used as a saddle it is hollowed at one end to fit the

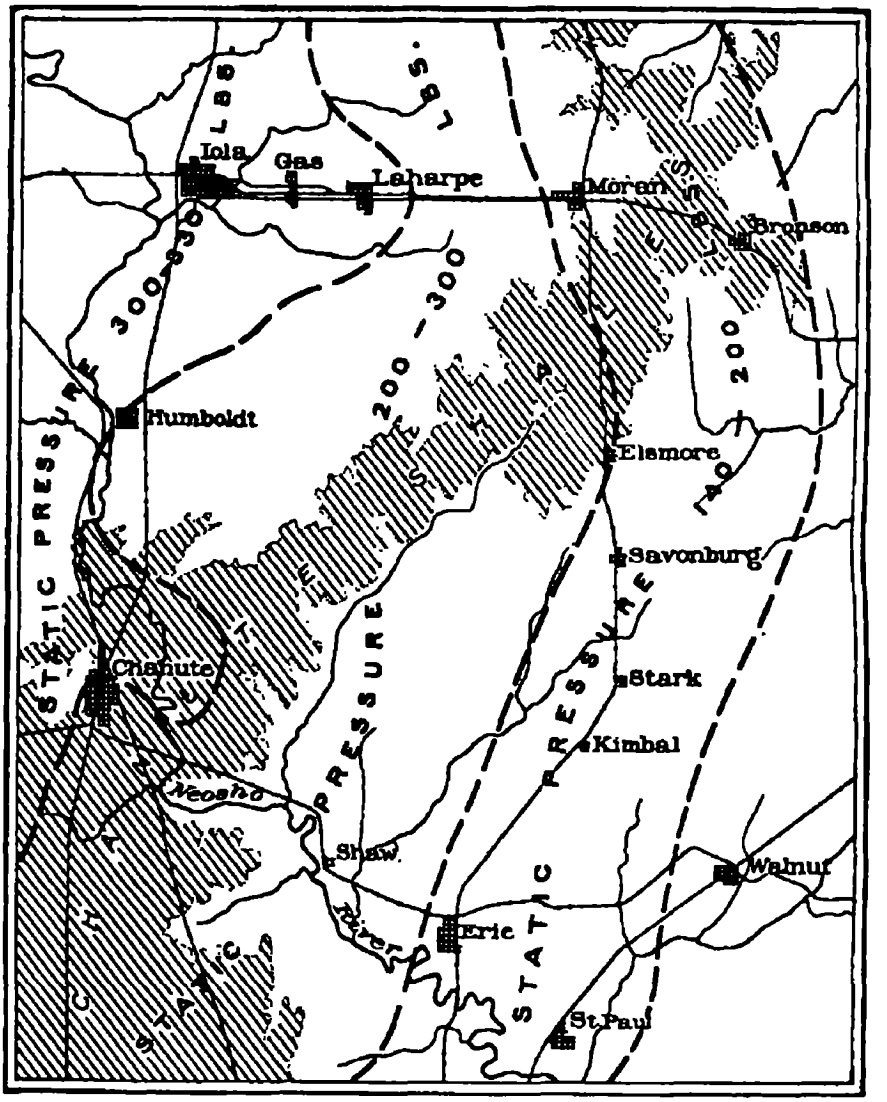

FIG. 13.—Map of Iola quadrangle, showing approximate zones of variation of static pressure of gas wells. The area of outcrop of the Chanute shale is indicated in order to show that the zones are approximately parallel with the strike of the geologic formations.

pipe and slotted longitudinally to allow the adjustment of the tube to the right position in the column of escaping gas. At the end of the block opposite the casing is attached a tightening arrangement operated by a screw. The chains which reach around the well casing are hooked into slots in the ends of a plate. After they have been drawn as tightly as possible about the casing, a few turns of the set screw sep-

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arate this plate from the block and make the instrument rigid on the well casing. At the end of the U-shaped tube, which is on the outside of the well casing, a pressure gage is attached by means of a flexible hose connection. For strong wells a spring gage is ordinarily used, and for wells having small capacity a gage containing mercury or other liquid is preferable. In adjusting a Pitot tube the mouth should be placed at about the middle of the radius of the casing, at which point the gas flows with a mean velocity. A slight variation in position at this point makes little or no difference, and with a small Pitot tube there is little chance of error.

When a measurement is to be taken the instrument should be attached to the mouth of the well and the tube swung to one side. The well is then allowed to blow off for a period, which varies somewhat with the capacity of the well, but seldom exceeds 4 to 6 minutes. When the accumulated head of gas has been spent the sound made by the gas issuing is uniform and the measurement may be taken. Often the well in blowing off must clear itself of water, mud, and pieces of shale. In such cases the observer must frequently wait 15 to 30 minutes. In rare instances there is no perceptible diminution of ejected material, and measurements are made with difficulty and are liable to be inaccurate, since the mud and shale and water interfere with the flow of the gas and are apt to clog the Pitot tube. When the flow of gas becomes uniform the Pitot tube is rotated over the mouth of the well and clamped in position at the level of the casing. If there is any doubt as to whether the well has blown off a sufficient length of time, the observer should note the register on the gage to see whether it varies, and in case it is found to do so he should wait until it is steady before taking the reading.

The capacity of a well for 24 hours is computed by means of tables which are in common use (see facing p. 50). In stating this capacity the size of the well casing or tubing should always be given, since the capacity varies with the size of the orifice.

The observations taken on wells in the Iola quadrangle show that the flow of gas at different places varies from a few thousand feet up to 10,000,000 feet per day, an average good well flowing about 4,500,000 feet per day. In general the stronger the static pressure of the well the greater the volume of production. Accordingly the best wells are situated in the western part of the area.

The maximum production of a gas well is reached as soon as it has been properly cased and has had an opportunity to clear itself of loose material. From then on it will show a gradual decrease in flow. A good gas well is free from water; the invasion of salt water lessens the value of the well and may entirely stop the issuance of the gas or render it so small as to be worthless. When many wells are drawing upon a reservoir of gas the volume falls off more rapidly, and

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as the flow decreases it is found necessary to connect more wells with the pipe line in order to obtain the desired amount.

The question which is of vital importance to the industries depending upon gas for fuel is that of the probable life of the field. Since there are undoubtedly a number of gas reservoirs, the question resolves itself into the probable life of the individual reservoirs. Inasmuch as it is impossible to know the vertical and lateral extent of the gas sands, no computation for an individual field can be made on this basis. However, a case may be assumed which will give an idea of the probable life of a gas field. Supposing that a gas sand having a thickness of 40 feet has an areal extent of a square mile, and that the static pressure of the gas is 300 pounds, we may measure the total amount of contained gas. Assuming that the gas occupies a pore or interstitial space in the sand equal to 38 per cent of the total volume (which is a very liberal estimate), 2.6 cubic feet of the sand would contain 1 cubic foot of gas at a pressure of 300 pounds, or 12.36 cubic feet of sand would contain 100 cubic feet of gas at atmospheric pressure. An area of sand 1 foot in thickness and having an extent equal to 1 acre would contain 43,560 square feet of gas at atmospheric pressure. If the sand is 40 feet thick and has the same extent, it contains 14,097,080 cubic feet, and in a square mile of 640 acres there would be 9,022,131,200 cubic feet of gas. To render this calculation more convenient for reference in computing for sands of various thickness and extent, the following table is presented:

Contents of gas under a pressure of 300 pounds per square inch in sands having 38 per cent pore space.

Thickness of sands in feet.	Cubic feet per acre	Cubic feet per square mile.
1	352,427	225,553,280
10	3,524,270	2,255,532,800
20	7,048,540	4,511,065,600
30	10,572,810	6,766,598,400
40	14,097,080	9,022,131,200

Assuming that the average daily output of a well is 4,500,000 cubic feet in 24 hours, the theoretical life of a well drawing upon a 40-foot sand bed under the conditions above outlined would be 2,004 days, or 5.5 years. However, variations in conditions of pressure during the life of the well change the time limit at which the sand will be exhausted. The life of the well, however, would not be much over 5 years. This calculation is based upon the open flow of the well—that is, the flow of gas into the air. A well, however, would not maintain a steady, uniform flow for a number of years, and when

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connected with a pipe line will exhaust itself much less quickly, since the total volume is seldom utilized.

Considering the problem of the life of a well from the standpoint of decrease in pressure, it is found that the above figures are largely corroborated. A decrease in static pressure of 4 pounds per month (a range of from 3 to 5.5 pounds has been observed) is about the average for the field. Some observers claim a decrease of 5 pounds per month. Few wells are considered to be of much importance after the pressure has fallen below 50 pounds. If the initial pressure is 300 pounds and the rate of decrease is 4 pounds per month, the life of the well, provided other conditions remain the same, would be 5.2 years, which corresponds closely with the time limit of 5.5 years given above. It should be remembered that the invasion of water or oil is liable to change the conditions of production at any time. If a decrease of 5 pounds per month is noted, the life of the well would be 4.1 years. The results in either case agree approximately with the experience of gas consumers in this field.

Measurements of flow of gas in pipes.—As already described on page 49, the Pitot tube may be used in measuring the volume of gas flowing through a pipe. If the Robinson instrument is used, a hole is drilled into the pipe and threaded, and the Pitot tube is screwed in, making a tight connection. The lower end of the tube, which must be turned parallel with the axis of the pipe, should be so inserted that it may be in the neutral zone or at the point of average velocity. With the Robinson instrument the pressure due to the velocity of flow may be measured, and from this the volume of gas passing through the pipe may be computed.

The forms of instrument shown in figs. 10 and 11 may be attached to the service pipe by drilling a hole and reaming it, the connection being made tight by the pressure of the steel point when the set screws on the saddle are turned. With these instruments the static pressure and the combined static and flowage pressure are measured and the pressure due to the velocity is found by subtracting. After the measurements are made the hole in the service pipe can be closed by driving in a portion of a large wire nail which has been tapered.

It is frequently desirable to know the amount of gas which is supplied throughout the day by a service pipe. In such a case the instruments may be connected with a recording pressure gage, such as a Bristol gage, which furnishes a chart of the pressures throughout 24 hours. Two charts are usually secured—one showing the static pressure and the other the static plus the flowage pressure. By deducting the former from the latter the flowage pressure is obtained. This method of taking flowage pressure has several advantages over the use of water or mercury gages or occasional readings with spring gages, since it is mechanical, and therefore positive, and the charts can

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be studied at leisure. Pl. X shows the records taken from a service pipe during 24 hours; the irregularities in the record line correspond with the increased or decreased amount of gas used by the plant; the jogs at 5 a. m. and 6 p. m. correspond with the closing and opening of certain of the burners for the changing from night work to day work, and vice versa.

OBSERVATIONS ON METHODS OF DEVELOPING AND UTILIZING OIL AND GAS.

By W. R. CRANE.

Methods of drilling.—Prospecting and drilling for both oil and gas is done by the American cable tool, or oil-well, system, for which there are three different forms of drilling devices—the standard or carpenter's rig, the rig and reel, and several styles of self-contained rigs. The order in which the drilling rigs are mentioned is in accordance with their adaptability to heavy work and deep drilling. The wells in the Iola quadrangle range from 500 to 1,500 feet in depth. The formations, as a rule, are easy to drill through, being composed principally of shales, sandstones, and some limestones. The shales predominate through probably seven-eighths of the thickness of the rocks encountered. In drilling through limestone the operation is commonly called "spudding" (a term applied to drilling through hard rock), this being the most difficult part of drilling. When a well starts in limestone no conductor is employed; in other portions of the field about 20 feet of conductor is required, for which purpose an iron casing, or a tube made up of eight wooden staves, is used. The shales, especially when charged with water, are moderately soft, and the holes must be promptly cased in order to prevent caving. The casing is usually carried to within 20 or 30 feet above the cutting bit and driven as the hole is deepened. It can be readily forced through the soft shales, but where hard sandstones and limestones are encountered it is necessary to ream the hole.

The usual height of derricks in the field is from 50 to 65 feet, varying with the length of the string of tools. Even with such comparatively low derricks considerable damage is done by windstorms, which occasionally wreck them. Accordingly many operators stay the derricks with guy ropes. After the wells are completed the upper portion of the derrick is lowered to a height sufficient for handling the casing in subsequent work on the wells.

Cost and rate of drilling.—Oil and gas wells are usually drilled by contract at a charge of 80 cents to $1 a linear foot, not including the cost of fuel and water. The speed of drilling ranges from 50 to 125 feet a day, a fair average being about 100 feet, a rate, however, which can not be attained in the harder rocks. The fuel used is either coal or natural gas. Coal is more expensive and more inconvenient to

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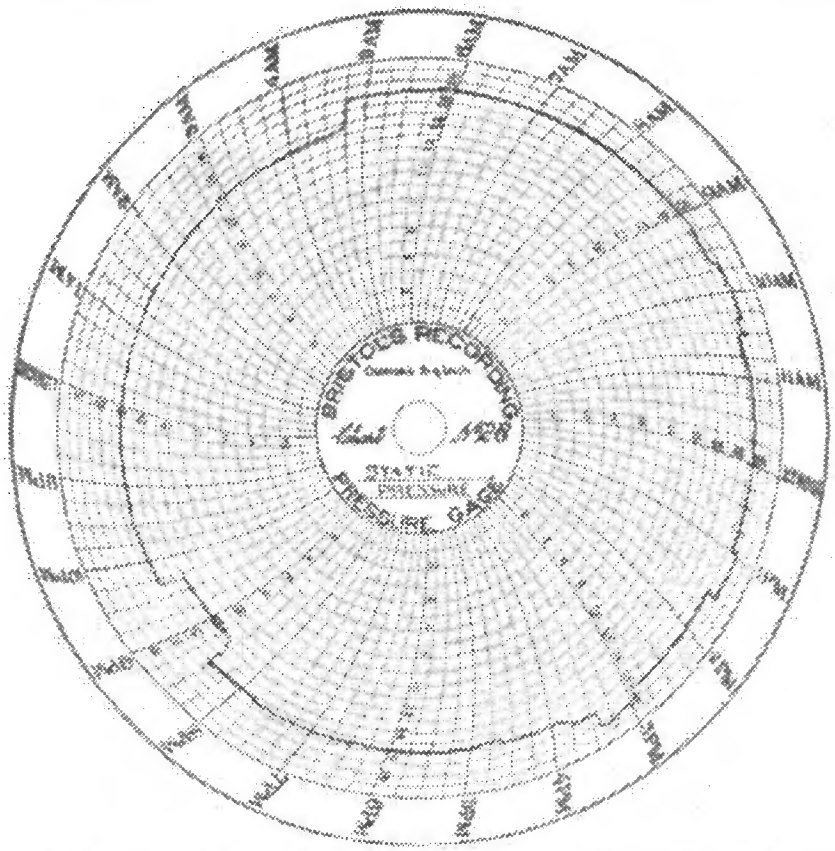
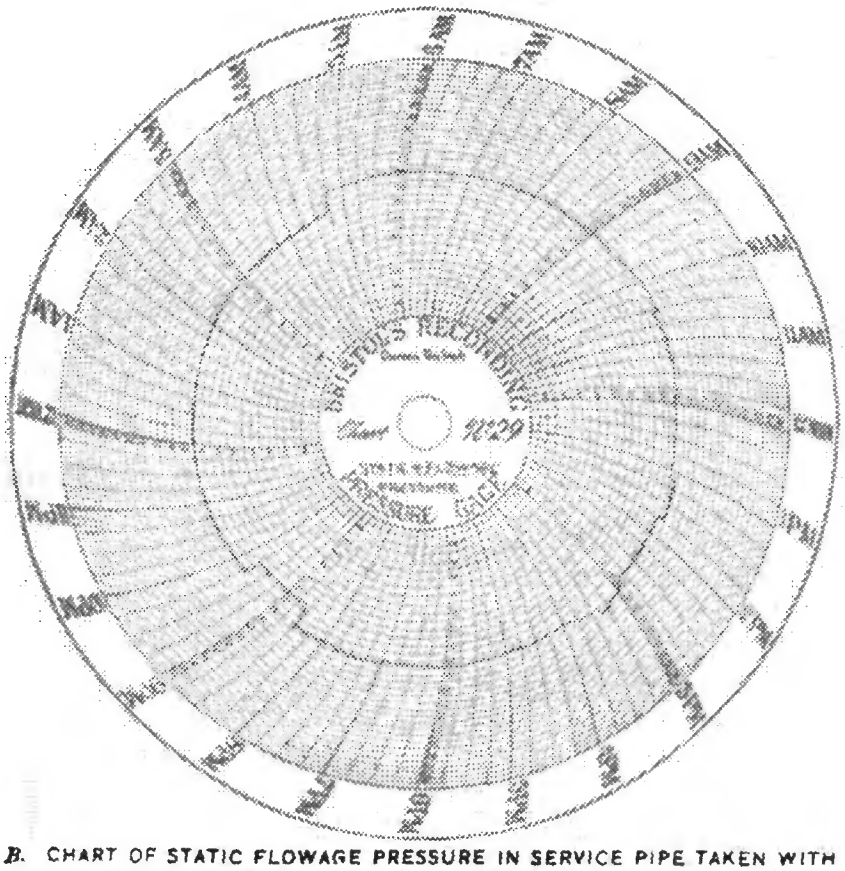


A. CHART OF STATIC PRESSURE IN SERVICE PIPE TAKEN WITH BRISTOL'S RECORDING PRESSURE GAGE.



B. CHART OF STATIC FLOWAGE PRESSURE IN SERVICE PIPE TAKEN WITH BRISTOL'S RECORDING PRESSURE GAGE.

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handle, costing about $40 for a hole 1,200 feet in depth. Where natural gas is employed it is customary to pay $50 per hole for the privilege of drawing a supply from the neighboring well; occasionally, however, the gas is sold at a fixed price for each foot drilled, a common charge being 5 cents per foot. The cost of a drilling rig varies according to the style used, but is somewhere about $2,500 or $3,000, including all tools. The labor item is by far the most expensive, ranging from 18 to 22 cents per foot. If the drilling results in a producing well the contractor finishes the well; that is, cases, tubes, and packs it, charging the owner with the actual cost of the materials used.

Systems of oil pumping.—There are several systems used in pumping oil from still or quiet wells, designated "shacklerods" and "compressed air." In the latter method air is forced into the tubing and the oil driven out through a smaller pipe. In other cases 2-inch and 1-inch pipes are inserted side by side, the smaller pipe making connection with the larger at a point a few inches above the end of the same; at the lower end of the larger pipe is attached a ball valve through which the oil enters, when the air entering the larger pipe from the smaller produces a suction; this constitutes what is commonly known as the geyser valve.

Shacklerods are used when wells are pumped. The power is communicated by a device capable of producing a reciprocating movement, commonly an eccentric, and is transmitted by rods, ropes, or wires. A single power plant may operate a large number of wells. The rods, ropes, and wires which run to the pumps are guided by supports which are placed short distances apart, and are known as "holders up," or if depressions are crossed are called "holders down." Rods are preferred on level ground, while ropes and wires are adapted to rough, uneven surfaces.

Distribution and control of gas supply.—Gas as it comes from a well is under too high pressure to be utilized, and must have its pressure reduced. This is accomplished by so-called reducing valves, which act automatically and are controlled by the pressure of the gas. For ordinary purposes the pressure must be reduced to 4 or 8 ounces from an initial pressure of 300 pounds, more or less, necessitating reduction by stages in order to do it safely. Two regulators are usually employed, the first reducing to 60 pounds and the second from 60 pounds down to the desired number of ounces. The gas enters the automatic reducer exerting its pressure on a relatively small surface and passes out through a larger chamber. The total pressure on the opposite sides of a diaphragm being exactly balanced, is less per square inch on the larger area.

Aside from the regulation of the pressures the supply is also controlled by receivers, usually placed near the point of consumption. These, as commonly constructed, are made of several 100- to 150-foot

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lengths of 6- or 8-inch pipe placed parallel and several feet apart, the ends being suitably connected with elbows and nipples. They constitute a portion of the main line and are provided with valves at both ends to control the flow of gas. The function of the receiver is to give a slight reserved capacity to the system by adding to the storage capacity of the main line near the point where it is drawn upon. It also serves to reduce pulsations in the flow of the gas.

It is considered one of the most difficult tasks in operating a gas line to keep it open during all seasons of the year, especially during cold weather. Formerly a crew of men were detailed to thaw out the pipes and regulators during freezing weather, but even with this precaution the pipes would frequently freeze and burst or become stopped up in whole or in part. If the wells are wet, or if even one wet well is connected with the system, serious trouble is experienced, and even with the driest wells some moisture accumulates in the pipes. The best methods for controlling supply employ drips and heaters, the former to remove the accumulated water and the latter to keep the gas at a temperature above freezing and prevent the condensation of water and the formation of ice and frost in the pipes. Drains are usually constructed of pipes ranging in length from 6 to 12 feet, with a diameter of from 6 to 8 inches. These are placed several feet below the intake pipe and are usually buried 2 or 3 feet below the surface of the ground. They are provided with caps at the ends, connection being made with the intake and discharge pipe by saddles or tees at both ends, the two pipes entering on the upper side. The gas enters with its burden of water at one end and loses it, or a large part of it, in passing to the point of discharge. Drains are usually placed at or near the points of consumption, although they are often placed along the pipe lines, in which case they are commonly called "bleeders." Heating devices are placed at intervals along the gas-pipe line and are usually situated on the low-pressure side of regulators at a distance of from 50 to 75 feet away. They are constructed by excavating a trench about 3 feet deep, 2 feet wide, and 25 feet long, walling it up and arching it over with brick. A hole is drilled into the pipe line on the lower side close to the open end of the furnace and a half-inch pipe provided with a valve screwed in and turned by means of an elbow, so as to run parallel with the main line and at a distance of from 4 to 6 inches below it. This pipe is perforated on the upper side and plugged at the rear end and is converted into a burner which can be used under the gas flowing in the main line.

Heaters are placed on the low-pressure side of regulators for the reason that gas loses much of its heat on expanding, and it is accordingly on this side of the regulators that freezing is more apt to occur. Heaters, of course, are not employed during warm weather, but drains are in constant use.

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Formerly when the static pressure was high it was the common practice to use small pipes for conveying gas considerable distances, but, nowadays, as the pressure falls off, or the gas is taken from weak wells, it is necessary to use larger pipes. Accordingly, for a line of say 8 miles, instead of the 4- and 6-inch pipes once in common use, pipes ranging in size from 10, 8, 6, and 4 inches are now employed in different sections in the order mentioned. It is claimed by gas companies that an 8-inch pipe line presents a resistance which reduces the pressure 9 pounds a mile. While this estimate may be rather high it gives an idea of the difficulties encountered in maintaining service through supply pipes.

PORTLAND CEMENT.

The large supply of natural gas in Kansas which is available as fuel, together with the inexhaustible deposits of materials suitable for the manufacture of cement which are located in the gas field, has brought about the introduction of the Portland-cement industry in the State. The Iola Portland-Cement Company's plant at Iola (Pl. XI, *B*), completed in 1900, enjoys the distinction of being the first one to use natural gas for fuel. It has a capacity of 3,000 barrels per day. A second plant, which will have a capacity of 1,500 barrels per day, has been located near Iola and is now nearing completion. Three or four additional cement plants are projected for near-by portions of the State and probably some of them will be built. Because of the importance of this industry and because it promises to assume greater proportions in the Kansas field, it is thought best to give a rather full discussion of the processes of manufacture.

TYPES OF SILICATE CEMENTS.[a]

There are three types of cement manufactured in the United States which may be classed as silicate cements. They agree in being hydraulic, though in different degrees, and in the fact that this property is due principally to the formation of tricalcium silicate.

Puzzolan cement.—The least important class of silicate cements is puzzolan cement, produced by the mechanical mixture, without calcination, of slaked lime and silico-aluminous material, the latter being either a volcanic rock or blast-furnace slag. Of this class about 500,000 barrels were manufactured in the United States in 1903.

Natural cement.—Next in importance are the natural cements, which are produced by the calcination, at a temperature below that of clinkering, of a clayey limestone (which may or may not contain a notable percentage of magnesia) in which the quantity of lime (plus magnesia) is so low relative to the silica and alumina that little or no free lime appears in the cement. Of this kind of cement about 7,000,000 barrels

[a] See Eckel, Edwin C., Municipal Engineering, vol. 24, May, 1903, p. 335; also vol. 25, July, p. 1.

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were manufactured in the United States in 1903. The plant at Fort Scott, Kans., manufactures this class of cement.

Portland cement.—The most important type is Portland cement, which is produced by the calcination, at the temperature of semivitrifaction (clinkering), of a mixture of calcareous and clayey materials in the proportion of about three parts of lime carbonate to one part of silica and alumina combined. About 16,000,000 barrels of Portland cement were manufactured in the United States in 1903. The cement manufactured at Iola is of this type.

CHEMICAL COMPOSITION OF PORTLAND CEMENT.

A comparison of the results obtained by analyzing many of the best grades of cement, both domestic and foreign, warrants the limitations in composition between certain percentages, which are set forth in the annexed table, which contains data already frequently published:

Chemical composition of different Portland cements.

	Minimum.	Maximum.		Minimum.	Maximum.
	Per cent.	*Per cent.*		*Per cent.*	*Per cent.*
Silica, SiO_2	19	26.0	Magnesia, MgO	0	5.0
Alumina, Al_2O_3	4	10.0	Sulphuric acid, SO_3	0	2.5
Iron, Fe_2O_3	2	5.0	Alkalies, K_2O and Na_2O	0	2.8
Lime, CaO	58	67.0			

As has already been stated, silicate cements owe their properties principally to the formation of a tricalcium-silicate molecule, $3CaO, SiO_2$. This was first suggested by Le Chatelier.[a] The tricalcium-silicate molecule is accompanied by varying amounts of similar molecules containing calcium and aluminum, and calcium and iron, the exact formulæ of which are not as yet so well understood. Le Chatelier[b] gives them as $3CaO, Al_2O_3$, and $3CaO.Fe_2O_3$, while Newberry[c] holds they should be $2CaO, Al_2O_3$, and $2CaO.Fe_2O_3$.

According to Newberry's formula, the ratio between lime and silica is about 2.8 to 1; between lime and alumina, about 1.1 to 1, and between lime and iron oxide, about 0.7 to 1. It is evident, therefore, that the per cent of lime required will vary with the amount of alumina and iron present. Should a cement be composed entirely of the lime-silica molecule it should have about 73.7 per cent of lime and 26.3 per cent of silica to correspond with the above formula; should it be composed entirely of the lime-alumina molecule it would have but a little over 52 per cent of lime; and if composed entirely of the lime-iron molecule it would contain only 41 per cent of lime. It is

[a] Annales des Mines, 1887, p. 418. [b] Op. cit., p. 418. [c] Jour. Chem. Ind., 1897, p. 899.

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evident, therefore, that the higher the proportion of iron and alumina the lower will be the proportion of lime and silica.

At present it is a little uncertain just what effect the alumina and iron have on the cement. Evidently they lower the fusion point of the clinker, and therefore reduce the cost of burning, particularly of the iron, and a proper amount of them is therefore desirable. The pure lime-alumina cement, made in laboratories, sets very quickly, indicating that the alumina tends to reduce the time of setting. A pure lime-iron cement, made by Doctor Schoch, would not set under cold water but did so readily under hot water, making a pat of constant volume and great strength. It is generally believed that the combined alumina and iron oxide should not exceed one-half the amount of silica. A desirable shale, therefore, is one which has some alumina and iron oxide in it to render the clinker more easily fusible, and at the same time not enough to make the cement too quick setting nor to reduce the proportion of the tricalcium-silicate molecule too greatly.

Certain objectionable elements, such as magnesia and sulphur, which may exist as impurities in the limestone, shale, or fuel are to be avoided. It is generally believed that magnesia is objectionable when present in quantities greater than 3 to 5 per cent. Years ago engineers generally held that not exceeding 2 per cent of magnesia should be present; later they raised this to 3 or 4 per cent, and now many of them admit that 5 per cent is allowable. Similarly, the amount of sulphur should not be very great—just how great is variously stated by different engineers.

It is probable that the particular condition in which the sulphur exists is an important consideration. In the form of calcium sulphate it is less objectionable than when in the form of calcium sulphide, as in the latter case the sulphur readily unites with the iron present and later is oxidized to iron sulphate, which first swells up and cracks the cement and later dissolves out, each process tending to destroy the cement. In the table quoted above the sulphur trioxide is limited to 2.5 per cent, yet when plaster or gypsum is added to retard the setting this amount may be considerably exceeded, since the sulphuric acid thus added, being already in combination with lime, can not exert any considerable chemical influence on the cement itself. During the last two years the price of good coal has been so high that many cement manufacturers have, it is reported, resorted to the use of cheaper coal, using some carrying so much sulphur that they would have rejected it previously. In this way, it is said, cement with the sulphur content considerably beyond the danger line as previously fixed has been forced on the market, without any bad results following.

By way of summary, then, it may be stated that a good Portland cement can be made from a limestone carrying from 75 to 100 per cent

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of calcium carbonate, by mixing it in proper proportions with clay or clay shales, provided the impurities present in the limestone are principally silica, alumina, and iron, and provided, further, that neither the limestone nor the shale has sufficient magnesia or sulphur to exceed the limits above stated. A limestone having from 85 to 90 per cent of calcium carbonate may be, therefore, just as desirable as one theoretically pure. The clay and clay shales may have a high proportion of lime present, as many of the Kansas shales do, and still be very desirable, for the lime in the shale will serve the same purpose as lime in the limestone. The main features to guard against are too large an amount of magnesia or sulphur, and an amount of alumina and iron oxide combined not equal to one-half the amount of the silica.

Physical properties.—Careful chemical tests are made at each step during the process of the manufacture of cement. Similarly, the finished product is subjected to careful tests, records of which are retained, showing the character of the cement going out in each shipment. All the physical properties which are desirable in cement are summarized below:

Gravity, 3.15 to 3.25.

Time of setting: Quick setting; initial set, 15 to 25 minutes; final set, not over 2 hours. Ordinary setting; initial set, 45 to 60 minutes; final set, not over 8 or 10 hours

Fineness: 100-mesh sieve, not more than 10 per cent residue; 200-mesh sieve, not more than 25 per cent residue.

Tensile strength: Neat: 24 hours, 250 pounds per square inch; 7 days, 450 to 500 pounds; 28 days, 550 to 800 pounds. Three parts sand mortar and one part cement: 7 days, 175 to 200 pounds; 28 days, 225 to 400 pounds.

Soundness: Should not check nor crack when tested in cold or hot water or steam, but should maintain a constant volume throughout.

RAW MATERIALS USED IN THE MANUFACTURE OF PORTLAND CEMENT.

Siliceous and pure limestones.—About 67 per cent of the Portland cement manufactured in the United States in 1903 was made from a mixture of argillaceous limestone and pure limestone, the principal material being argillaceous limestone which approximates the ideal Portland-cement material, the pure limestone used being added to obtain the proper composition.

Marl and clay.—Calcareous marls obtained from lake basins are extensively used. Inasmuch as they are usually quite pure lime carbonates, they require the addition of clay to bring them up to the proper composition for Portland cement. About 12 per cent of the cement produced in 1903 was of this kind.

Chalky limestone and clay.—Chalky limestones vary from rather pure calcium carbonate, low in both magnesium and clayey materials, to an impure clayey limestone requiring little additional clay to make

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it fit for use in the manufacture of Portland cement. About 5 per cent of the cement produced in the United States in 1903 was manufactured from such material.

Caustic-soda waste and clay.—Precipitated lime carbonate, which is a by-product in the manufacture of alkali, may be combined with clay material for Portland cement. However, there is not much of it used.

Slag and limestone.—Slag running high in lime, which is a by-product of blast furnaces, may be mixed with pure limestone and burned to form Portland cement, but cement of this class amounts to but a very small per cent of the annual production.

Pure (hard) limestone and clay or shale.—These materials are the ones used in the manufacture of cement at Iola. The limestone, being relatively pure, requires the addition of a considerable amount of clayey material in order to produce the desired combination. About 13 per cent of the Portland cement manufactured in the United States is from such material.

CEMENT MATERIALS IN THE IOLA QUADRANGLE.

There is practically no limit to the amount of Portland cement that might be manufactured from limestones and shales located within the Iola quadrangle. There are several localities at which materials of suitable chemical composition and physical properties may be obtained, and the location of the cement plants thus far has been chiefly determined by the availability of gas, water, and railway facilities. The limestone used is from the Iola formation, which occurs in a heavy bed and is quite uniform in character, and the shale is from the Concreto formation which overlies the limestone. The relation of these two formations is particularly fortunate, and the fact that the shales occur in hills rising above the limestone has made possible the location of the plants conveniently near both materials.

The geologic map accompanying this report (Pl. I) shows the limits and extent of the limestone and the shale formations. Not all of them are suitable for the manufacture of cement, and in some cases it is impossible to find both shale and limestone at the same locality. The Iola quadrangle, however, may be considered as capable of supplying all the material which the industry may demand, and bids fair to become the center of the cement industry in the State.

CEMENT PLANTS AND PROCESSES OF MANUFACTURE.

The plant of the Iola Portland Cement Company, situated just south of the limits of Iola, was the only one in operation in 1903. The Kansas Portland Cement Company, located about a mile northeast of Gas, a station 2 miles east of Iola, will begin manufacturing early in 1904. The two plants are similarly situated. They are located at

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the base of hills from which the shale is obtained, the limestone being quarried at a slightly lower level near by.

Iola Portland-cement plant.—The first process in the manufacture of cement is the quarrying of the material. At the Iola plant the shale is dug from the side of a mound and the pit accordingly requires no artificial drainage, while the limestone which is used lies below the level of the ground and must have its pit pump (Pl. XI, A). The limestone is quarried by means of heavy blasting, which breaks it into large pieces, some of which require additional breaking in order to reduce them to a size that permits easy handling. Both shale and limestone are transported to the mills by means of a steam tram.

The next process is the crushing of the material. The limestone is put through a Gates crusher and the shale through a Williams mill. The material is then dried so that it will not clog in the subsequent process of pulverizing. It is then finely ground in Griffin mills, after which water is added to it, and it is agitated in pug mills.

Water is used in mixing the materials, the method being known as the wet slurry process. The shale and limestone are stirred together in a large tank from which the mixture is conveyed by means of pipes. It is essential at this stage that the slurry should be of the proper composition. An attempt has already been made to govern this in a rough way by using definite amounts, by w[illegible] and the limestone, and when the material has reach[illegible]hemical analyses are made and the additional amo[illegible]r shale, which the mixture may require, are adde[illegible] the furnaces. At this plant 21 rotary furnaces a[illegible]g 3,500 barrels per day of 24 hours. They are ma[illegible] steel in the form of a tapering cylinder, about 60 [illegible] feet in diameter at the larger end. They are li[illegible], which reduces the internal diameter to about 6 f[illegible] and to between 4 and 5 feet at the rear or smokestack end. They are mounted on trunnion and cog gearings which give them about 2 revolutions per minute. The slurry is automatically fed into the smaller or upper end of the kiln and the gas into the opposite end; the blaze travels through the kiln, producing the greatest heat near the burner. The inclination of the kiln causes the slurry, which is prevented from coking by the rotation of the kiln, to travel toward the lower end, thus becoming heated gradually. As it passes the hottest place in the furnace it is fused into what is known as clinkers, in the form of little balls from one-half to one inch in diameter, which roll out at the lower end of the kiln into a conveyor. After the clinker has cooled it is pulverized by Griffin mills and conveyed to storerooms, where it is held for shipment. Before grinding, however, a minor amount of crude gypsum is added in order to retard the set. The sulphur trioxide

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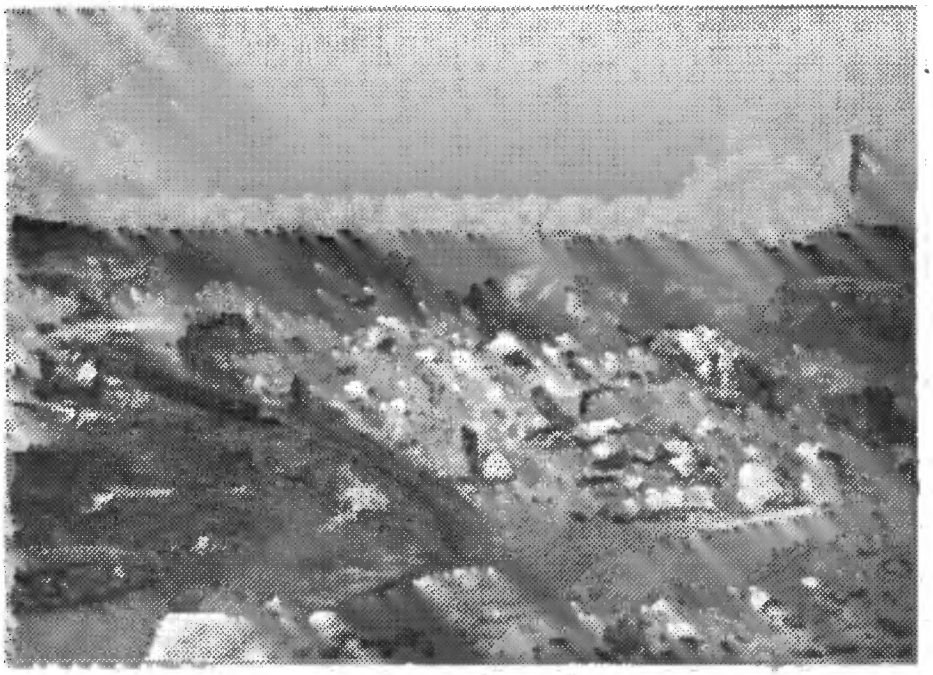

A. LIMESTONE QUARRY AT THE IOLA PORTLAND CEMENT COMPANY'S PLANT.

B IOLA PORTLAND CEMENT COMPANY'S PLANT.

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of the gypsum combines with the lime alumina of the cement, which would otherwise be quick setting.

Kansas Portland-cement plant.—This plant, which will begin operations early in 1904, is similar in a general way to the one just described; the materials used are the same and will be obtained by the same methods. The limestone will be ground by an Austin No. 8 gyratory crusher, which will receive the rock directly from the quarry. It will then be passed through a revolving screen which will take out about two-thirds of the material and send the remainder to a No. 5 crusher. The shale will be treated first with a Williams pulverizer and the raw material finally pulverized by Griffin mills set in wooden frames. The plant will have 8 rotary kilns, giving a capacity of 1,500 barrels per day of 24 hours.

BRICKMAKING.

CHARACTERISTICS AND PROPERTIES OF CLAYS.

Definition and composition of clays.—Clay may be defined from a physical standpoint as a variable mixture of fine-grained mineral fragments possessing, when wet, the property of plasticity which permits it to be molded into any desirable shape, and, when subsequently dry, to retain that form. The mineralogical constituents of a clay are hydrated aluminous silicates, free silica, iron oxide, carbonate of lime, and fragments of various silicate minerals in more or less decomposed condition that have survived the destructive agencies to which they have been subjected. When examined chemically the components, in addition to chemically combined water, are found to be silica, alumina, iron oxide, lime, magnesia, potash, and soda, together with small amounts of titanic acid, sulphuric acid, manganese oxide, phosphoric acid, and organic matter. The hydrated silicate of alumina known as kaolinite is commonly spoken of as the clay base; it is derived from the decomposition of feldspars. The additional substances in clays are due to the varying amounts of other mineral matter which was present in the original rocks or which has subsequently become mixed with the kaolinite.

When a clay is heated above a certain temperature it forms a hardened rock-like mass which if reground no longer shows plasticity. In the process of burning certain substances in the clay assume a glassy form. Commonly, in burning clays, three stages are recognized, namely, incipient fusion, fusion, and viscosity, according to the degree of completeness of the fusion. The substances which fuse readily are spoken of as fluxing materials, and the more refractory are spoken of as nonfluxing. However, if the temperature be sufficiently high all the elements in the clay will fuse.

Classification of clays as to origin.—Clays may be classified as residual and transported clays. Residual clays are formed by the dis-

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integration of rocks in place. The original sources of all clay material are igneous rocks, the decomposition of their mineral elements, especially the feldspars, giving rise to a surface layer of clay. Similarly, stratified rocks upon weathering produce clays, the percentage of clay varying according to the nature of the rocks. Examples of clays originating in this way are the disintegrated surfaces of shale beds and the clays which result from the solution of limestones. Such clays approach very closely to the condition of soils.

Transported clays are those that result from various mechanical agencies which have removed disintegrated rock materials from the place of origin. Silts which have been transported by running water, glacial drift which has been produced by the action of ice, loess which consists largely of wind-blown material, and shales which are derived from clay deposited in lakes and oceans, are all transported clays.

It is possible that certain clays have resulted from precipitation and are accordingly of chemical origin.

Classification of clays as to uses.—Aside from the uses to which clays are adapted, either without artificial preparation or by the admixture of additional materials, they are the source of a large number of manufactured products. These may be classed as (1) paving brick; (2) common brick, front brick, washed brick, terra cotta, roofing tiles, decorative tiles, terra-cotta lumber, and enameled brick, used in building and decorative art; (3) hollow ware, including drain tiles and tile pipes, used for engineering and hygienic purposes; (4) refractory products, including fire brick, glass pots, and gas retorts, used in manufacturing and engineering industries; (5) pottery and porcelain, including washing clays and slip clays, used for domestic and decorative purposes.

CLAYS IN THE IOLA QUADRANGLE.

The formations of the Iola quadrangle are all stratified. The residual clays derived from them are rather unimportant. Formerly they were used to a limited extent in the manufacture of common brick, the material utilized being more or less mixed with organic matter and therefore largely in the nature of a soil. Deposits of this nature are usually thin and variable.

There are a number of important shale beds within the area which, upon being ground, furnish a clay suitable for the manufacture of paving brick, common brick, hollow ware, and common pottery. Thus far the only use made of them is in the manufacture of common brick for buildings and sidewalks. The shales used, although coming from different geologic formations, are similar in all instances. The bricks are burned with natural gas, and the cheapness of this fuel has stimulated the development of this branch of manufacture. Thus far no plant has been erected for the manufacture of vitrified or paving brick, this being due partly to the fact that the demand has been

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principally for common brick, and partly because the paving brick needed has been supplied from plants outside of the quadrangle. The construction of down-draft kilns would probably permit the burning of vitrified brick; some experiments have already been undertaken along this line. In adjacent portions of the State some hollow ware and pottery are manufactured from the same class of shales that are found within the Iola quadrangle.

CONDITION OF THE BRICK INDUSTRY.

Brickmaking is an important industry in the vicinity of Chanute, Humboldt, Iola, and Laharpe. The great bulk of the product is sold at home, the demand for building brick having been very large on account of the growth of towns where industries using oil and gas have been established. The capacities of the plants have outstripped the local demand and bricks have been shipped as far south as Galveston, as far west as Albuquerque, and north and east far beyond the limits of the State. For three or four years conservative business men have been arguing that the demand for brick was unnatural and that the rapid establishment of plants would soon result in so great a production that the prices would be lowered almost to the point of cost, but such predictions have not yet been verified, the market for the season of 1903 being better than at any other time since brickmaking was begun in the gas belt. What the further development will be is a mere guess, but it seems probable that there will be no material decrease in the near future. During 1903 approximately 65,000,000 brick were manufactured at the plants described below, with a value, at the factories, of about $325,000.

Brick plants at Chanute.—Two brick plants are located at Chanute, one about 2¼ miles south of town, within the Iola quadrangle, the other about 3 miles southwest of the town, one-half mile outside the quadrangle. The plant south of the town belongs to the Coffeeville Vitrified Brick and Tile Company. It has 7 kilns, with a capacity of 300,000 brick each and an aggregate capacity of from 60,000 to 75,000 brick each 24 hours. The kilns are of the ordinary kind, open at the top, except when temporarily closed with each charge. Gas is admitted on each side at the base. The kilns are stationed side by side about 20 feet apart. A large supply pipe rests on top of the ground midway of the alley between each two adjacent kilns, with 18 side lines, laid about 3 feet apart, leading to each, giving 36 burners to each kiln. A mixer with a 3-inch cross section is placed on each side pipe just outside the kiln. The temperature of the kiln is controlled largely by the amount of air admitted. Instead of regulating the amount of gas entering the kiln it seems to be more convenient simply to regulate the amount of air, which is easily done by adjusting the collar on the mixer so as to make larger or smaller air openings and in this way control the amount of actual combustion.

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Steam power is used throughout the plant, the steam being generated in boilers by burning gas. Two boilers, with an aggregate capacity of 180 horsepower, furnish the necessary steam, which is used in one engine with a capacity of 128 estimated horsepower.

The shale is first pulverized by passing through an ordinary dry-pan pulverizer. From here it goes to the pug mill, where it is tempered by a stream of water properly controlled, and passes on to the auger and out onto the belt conveyer, as customary in modern brick plants. A rotary cutter, with 22 wires, with a maximum capacity of 125 brick per minute, cuts the clay into brick, which are then carted away to a gas-heated drying room, whence they are built directly into the kilns.

The mine, or shale pit, is a few rods north of the mill and is sunk downward from the surface, the shale being drawn up the incline in cars operated by a cable from the mill. As the pit now appears its walls present a vertical section of about 60 feet. A sandstone at the top is 12 feet thick at the north side of the pit, but decreases southward, owing to surface variations, to a thin edge, where mining first began. Shale underlies the sandstone, continuing to the bottom of the pit and probably much deeper. About 5 feet below the bottom of the sandstone is an 18-inch bed of limestone, as seen at the south end of the pit, which gradually decreases northward and entirely disappears 75 or 100 feet before the north end of the pit is reached. Below the limestone the shale is uniform in character, fine-grained, dark gray in color, and practically free from sand.

In operating the mine the material is first loosened or broken down by blasting. An ordinary power churn drill is operated in the sandstone, which is first blasted off and carried away, so that the breast of sandstone precedes the breast of shale by a few feet. All the loose sand and the smaller fragments produced by the shot are mixed in with the shale, and help to prevent shrinkage while firing the brick. The shale is drilled by hand drills of the auger type, two men drilling a hole 5 feet deep in from 30 to 45 minutes.

The plant southwest of Chanute, owned by the Kansas Vitrified Brick Company, and lying outside the limits of the Iola quadrangle, obtains its shale from the Concreto bed, which overlies the Iola limestone. The company manufacture the same kind of brick as those already described, its plant is similar, and its shale obtained from a pit level with the surface of the ground. There is not enough difference in the general properties of the two shales to enable one to distinguish between them by examining hand samples. A description of one plant is, therefore, practically the same as a description of the other.

Brick plant at Humboldt.—One brick plant is located about 1¼ miles north of Humboldt and is owned by the Humboldt Brick Manufacturing Company. It began operations in the spring of 1898 and has

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a capacity of 40,000 brick a day. Its machinery consists of the regulation dry pan for crushing the shale and a pug mill and auger for molding the brick. This company is making a specialty of sidewalk brick, which they re-press, producing a variety of patterns on the top side of the brick.

The plant is operated throughout by gas for fuel. Steam power, generated by burning gas, is used, and the kilns are fired by gas, being arranged practically the same as those of the Chanute plant. The shale used lies on the surface adjacent to the plant and is obtained by sinking a pit, the material being serviceable almost from the surface of the ground. As these shales lie almost on top of the Iola limestone they belong to the Concreto horizon, the same used by the Kansas Vitrified Brick Company for its plant southwest of Chanute. The quality of the shale here is practically the same as at Chanute, and the quality of the brick likewise, whatever differences may be observed being due principally to slight differences in manufacturing processes.

Brick plants at Iola.—There are 4 brick plants at Iola, 2 owned by the Iola Brick Company, 1 by the Star Brick Company, and 1 by the Home Brick Company.

The Iola Brick Company's plant No. 1, with a capacity of 35,000 brick a day, is situated about a mile east of the town. It was installed in 1896, and manufactures principally common, or building, brick and sidewalk brick. Plant No. 2, installed in 1899, is located south of the town, on the north side of the mound which supplies shale to the Iola Portland-Cement Company's plant.

Its plant No. 1 (Pl. VIII, *A*) is the oldest plant at Iola, and was one of the first to employ gas for burning brick. It employs the up-draft or open-top kiln, with the tops temporarily closed for each charge. Gas is admitted to the side of the kiln as described for the Chanute plant. The shale is obtained near the plant by digging or mining; the soil covering is thin and the shale lies immediately below. The pit is operated to a depth of about 20 feet and is developed laterally as requirements demand. As the shale lies immediately on top of the Iola limestone it belongs to the Concreto series.

Plant No. 2 was established at the foot of a little mound south of town, because experience showed that shale could be mined more cheaply from a hillside, where no expense was necessary for draining the shale pit and where gravity could be used in transporting the shale from the pit to the plant, than on a level where the pit was worked downward and must be drained by pumping. The plant has a capacity of about 40,000 brick a day. Its general equipment, the kind of brick made, and methods of operations are in no essential way different from those at plant No. 1.

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In 1899 the Star Brick Company established a plant at Iola, which has a capacity of 40,000 brick a day, and is located on the northeast corner of the mound which supplies the Iola Portland Cement Company with shale. It produces common building brick and sidewalk brick. The shale used is the same as that used by the Iola Brick Company in their plant No. 2.

The Home Brick Company's plant, located about 1½ miles east of Iola, began operations in June, 1902. The plant was built expressly to manufacture a high grade of pressed brick for fine buildings and has started out very successfully, supplying the brick for the new courthouse now in process of erection at Iola and already receiving a satisfactory patronage from outside sources; it also makes common building brick. Its total capacity is 30,000 brick for a 10-hours' run. It uses shale immediately at its plant, there being about 30 feet of the Concreto series there. It has its own gas wells near the plant and will drill more when the ones now in use are exhausted.

Brick plants at Labarpe.—Labarpe had one brick plant in operation and two others in process of construction during the summer of 1903. The plant in operation was installed in 1900 with a capacity of from 20,000 to 25,000 brick a day. Gas is the only fuel used, the motive power being steam generated by gas. The kilns are supplied with gas drawn through mains and fed into the kilns as at Chanute. The kilns used are of the ordinary up-draft variety. This plant makes common, or building, brick and sidewalk brick only. It obtains its shale by mining the Chanute shales from underneath the Iola limestone, having run an incline through about 35 feet of limestone; the shale is now being worked to a depth of 25 to 30 feet below the bottom of the limestone. In obtaining the shale by this method, it is necessary to mine it out so as to leave large pillars standing to support the roof. A room-and-pillar system like that in coal mining is employed. The entries and rooms, however, are very wide, as the overlying limestone is heavy and unusually free from vertical seams.

COAL, LEAD, AND ZINC.

COAL.

There are no workable beds of coal outcropping in the Iola quadrangle. Some beds have been found, but their thickness does not exceed 6 inches. In the Dudley shale on the northwest side of the limestone ridge, which terminates 3 miles northwest of Walnut, a thin coal bed was discovered in digging a well. On Coal Creek, 2 miles east of Humboldt, a bed of coal about 6 inches thick occurs in the Chanute shale. At a place where it was under very thin cover a small amount was obtained by stripping. The outcrop of this bed, or possibly of other beds which occupy the same horizon, has been noted at

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several places along Coal Creek, and small pieces are occasionally washed out of the shales during high water.

Some prospect wells have been sunk for coal, and others which have been bored in search of oil and gas show the occurrence of coal beds at a considerable depth, most of them in the Cherokee shale. No very reliable data in regard to their thickness are available, since they have usually been encountered in drilling with a churn drill. The record of a well sunk at St. Paul with a diamond drill shows several beds, the thickest of which is 2 feet; this was found at a depth of 184 feet, occupying a position immediately below the Pawnee limestone. In the Cherokee shale six beds of coal were reported, varying in thickness from 6 inches to 1½ feet. The Acers well at Iola, commonly known as the old mineral well, was drilled with a diamond drill in search of coal, but no information as to the coal beds encountered is available. Evidently none were found which were considered thick enough to work.

LEAD AND ZINC.

In digging wells which pass into or through the limestone formations, small amounts of lead and of zinc have occasionally been found. An occurrence of this character was observed in a well in the Shaw limestone just south of Savonburg. The lead and zinc, although conspicuous in the débris thrown out from the well, were not considerable in amount. Such occurrences of lead and zinc are very common in limestone formations, and may be considered sporadic and not indicating deposits of economic importance.

WATER SUPPLY.

In the Iola quadrangle the portion of the rainfall that is carried away by streams finds its way to the Mississippi either around the northern border of the Ozark region by way of the Missouri or to the south round the southern border by way of the Arkansas. The watershed between these two drainages is a low narrow divide, which extends from the foot of the Rocky Mountains near Denver, Colo., into southeast Missouri. It enters the Iola quadrangle west of Bayard and passes by the way of Moran to Elsmore and thence in a southeasterly direction. The streams which head to the east of the divide form the headwaters of the Little Osage and its tributary, the Marmaton. Practically all the remaining streams flow into Neosho River within the borders of the quadrangle.

Streams.—All of the streams here under discussion carry potable water. Neosho River is the largest. It enters the quadrangle at the northwest corner and flows nearly south along the west border of the area to Chanute, from which point it flows southeast, passing out of the quadrangle at about the middle of the south side. Its source is about 125 miles to the northwest in Morris County. As its hydro-

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graphic basin has an area of approximately 3,670 square miles and has an annual precipitation of 35 to 40 inches, it carries a large amount of water and consequently is a stream of great economic importance. Its average flow, as estimated by Mr. F. H. Newell,[a] based upon measurements made by W. G. Russell at Iola during 1902, is 2,492,041 acre-feet per annum. The flood plain averages about 2 miles in width, although in some places where heavy limestones are cut through its width is less than a mile. The stream meanders through the flood plain, producing many short oxbow curves and broad windings. In times of high water it overflows its banks and inundates almost all of the flood plain area, causing great destruction of crops and domestic animals and sometimes of human life. Along portions of the river dikes have been constructed to protect the bottom lands from overflow.

In the part of its course which lies in the Iola quadrangle, the Neosho has reached a graded condition and consequently there are no falls or cataracts along it and few and unimportant riffles or shoals. It is very serviceable as a supply of water for domestic uses. Iola and Chanute have city water plants which draw their supply from it and Humboldt contemplates the early installation of a similar plant.

A number of small streams enter the Neosho from the west, the largest of which are Owl Creek near Humboldt, Village and Turkey creeks near Chanute, and Elk Creek opposite Shaw. From the east it receives Elm Creek at Iola, Coal Creek at Humboldt, Big and Canville creeks near Shaw, Fourmile Creek near Erie, and Rock Creek near St. Paul.

The streams in the northeast part of the Iola quadrangle rise near the escarpment formed by the Bronson limestone. This section is more deeply dissected than the remaining portion of the quadrangle, the valley of the Marmaton, where it leaves the quadrangle, being 200 feet below the upland.

The only stream in the area under discussion large enough to furnish water power is the Neosho. A dam built across it at Iola has furnished power for a flouring mill and a sawmill. At Humboldt a dam has also been employed for running a flour mill and some small factories. Since the discovery of natural gas the use of this water power has been neglected to a great extent and there is little indication that it will ever be restored so long as the gas is abundant. The possibilities of water power along the Neosho are, however, worthy of notice. The stream has a fall of over 100 feet within the quadrangle, which amounts to about 3 feet per mile. At many places there are sites favorable for the construction of dams which might give a fall of from 12 to 15 feet. It is possible that some day the power which may be developed in this way will be used.

[a] Newell, F. H., Report of progress in stream measurements for the calendar year 1902; Water-Sup. and Irr. Paper, U. S. Geol. Survey, No. 84, 1903, p. 116.

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Springs.—There are practically no prominent springs in the country under discussion. In many places, however, the seepage of water on hillsides and along the minor drainage courses where there is a considerable mantle of detrital material and soil makes possible what are called springs, although they are in reality of the nature of wells. Occasionally seeps are found which, during wet weather, furnish a small flow which is usually utilized as stock water. Nowhere are springs depended upon for domestic use, though the water supply is often denominated a spring by the inhabitants.

Wells.—Shallow wells formerly supplied water for domestic use. They were spring wells of the nature above described. Now that the country is practically all settled and it has become necessary to obtain water on the uplands where there are no small drainages, many deep wells have been dug or drilled. Good potable water is not readily found, since nearly everywhere the shales encountered in drilling contain soluble mineral matter which gives the water a brackish taste. Many wells are supplied by ground water which finds its way along the joints and bedding planes of the limestones, in which case it is of the quality spoken of as hard. In certain areas, however, the formations carry beds of sandstone (particularly in the belt of country occupied by the Chanute shale), from which water that is soft may sometimes be obtained. A few years since, efforts to obtain water which would not fail during unusually dry seasons led to the drilling of deep wells and developed the fact that where the sandstones in the Chanute shales can be reached at a moderate depth, a supply of good water is often available. By reference to the map it will be seen that this belt of country extends in a diagonal line through the quadrangle to the west of the line of outcrop of the formation. In the vicinity of Moran and Bronson the importance of this water-bearing horizon has been quite fully determined. In prospecting for water farther west these sandstones lie at a greater depth and the water found in them is usually more or less salty. An explanation of this may be found by studying the dip of the formations in the field in general; the rocks dip west and are known to extend for a long distance in that direction without a change of dip, their only outcrop being that in which they take in the water. Accordingly they become saturated, and having no outlet, the soluble salts in the rocks tend to become concentrated into a brine. The deep wells drilled in prospecting for oil and gas have shown that salt water is practically everywhere present in the rocks which lie at a considerable depth. The portions of the formations near the outcrop may be said to have been leached of their soluble salts, and accordingly it is only in these places that the water is fresh.

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SOILS.

Origin of soils.—Soil is a mixture of fine-grained materials which have resulted from the disintegration and decomposition of rocks and which are mingled with a varying amount of organic material and with chemical substances derived from solution. The fragmental materials are derived from igneous or sedimentary rocks and may be redeposited and eventually form other sedimentary rocks. In the complete cycle soil represents a transitory stage. In the redeposition of rock materials, mechanical sorting gives rise to beds which are arenaceous (sandstones) or argillaceous (shales), according as the material that predominates is sandy or clayey. Rock materials which go into solution, such as salts of lime and magnesia, may be deposited in the soils by evaporation or precipitation, or, if these processes take place from bodies of water, may form sedimentary beds (limestones, dolomites, gypsum, etc.).

The principal classes of sedimentary rocks are (1) limestones and dolomites, (2) shales, and (3) sandstones. They, however, grade into each other, so that limestones are more or less shaly and sandy, shales are more or less limy and sandy, and sandstones are more or less shaly and limy. Limestones and dolomites, upon weathering, are largely carried away in solution. The argillaceous matter which they contain goes to form a clay soil, while the small fragments and the coarser pieces which result from weathering, as well as the included flints, form sands and gravels. Sandstones upon disintegration become sands and produce sandy soils, while shales give rise to clay soils.

Classification of soils.—In accordance with the foregoing discussion soils may be classified according to texture as gravelly, sandy, silty, and clayey. These classes may be recognized without mechanical analysis. Inasmuch as soil particles are, however, never of uniform size, soils may be more appropriately described by combining the textural terms; for example, we may speak of sandy clays, silty clays, sandy silts, etc.

According to their place of origin, soils may be classed as (1) sedentary, (2) migratory, and (3) transported. Sedentary soils are those which are derived by disintegration and decomposition of rocks in place, the materials which are removed in the formation of the soil being carried away in solution. Migratory soils are those which are shifting from their place of origin and are moving with the slope of the surface, largely as a result of gravitative action. The area occupied by them is usually connected with their place of origin. Transported soils consist of materials which have been moved by the action of water, ice, or wind. They may accordingly be considered under the subclasses of alluvial, glacial, and eolian soils.

Soils of the Iola quadrangle.—The area here under discussion has not been subjected to glacial action and there are no important accumulations of wind-blown materials. Along Neosho River and some

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of the larger creeks, however, there are transported soils which are alluvial. Neosho River, which is the only important stream entering the area, traverses in its upper course a belt of country occupied by sedimentary rocks. The materials which it transports are accordingly sands, clays, and gravels derived from limestones, sandstones, and shale beds. Except for the assorting of these materials and the commingling with them of a larger amount of organic matter the alluvial deposits do not differ from those found along the creeks that lie within the Iola quadrangle. The alluvium along Neosho River is seldom more than 2 miles wide, and in places its area is so constricted as a result of the rock walls which limit its flood plain that it is little more than a mile in width. Within the alluvium are occasional beds of gravel and sand, but its surface is principally covered with fine silts. Along Rock, Canville, Big, and Elm creeks, as well as on certain smaller streams, are narrow areas in which flood-plain deposits are formed, the material being derived from the drainage basins of the streams.

On the uplands the soils are in part residual and in part migratory. The rocks, as will be seen by reference to the geologic map, are shales and sandstones alternating with limestones. The topography is of the indistinct terrace and escarpment type. The soils lying on the terraces have resulted largely from the disintegration of rocks in place, while at the base of the escarpments and on the more decided slopes the soils are migratory.

It is not possible to show in this discussion the types of soils which would be distinguished in a soil survey. However, the limestones, sandstones, and shales have each contributed to the soils, and accordingly we find clays, gravels, and sands, which in many cases may be traced directly to the beds that have given rise to them through disintegration. The gravels have been formed by the weathering out of the flints found in the limestones, especially in the Bronson and its equivalents, the Hertha, Dennis, and Drum limestones, and in a minor degree in the Parsons, Iola, Allen, and Piqua. Most of the limestones contain but little argillaceous and arenaceous material. The calcareous portion goes into solution and is redeposited by evaporation and precipitation, so that in many places the lime content of the soil is large.

The sandstone and shale formations vary in character and lateral extent with individual beds. The Chanute shales are particularly sandy as compared with the other formations, but the soil derived from them shows a larger percentage of sand than the rocks themselves, since the sand is not so readily transported as the clay and forms surface accumulations. The soils from the remaining shale beds are largely clay soils.

The thickness of the soil is important as determining its agricultural value, and is related in large measure to the geologic formations and

the structure of the rocks. In the areas occupied by the limestones weathering produces dip slopes on the upper surface of the limestone beds, and the migration of the soils and their transportation by running water are apt to reduce the residual material to a thin mantle. Accordingly in dry seasons these thin soils do not produce well, since they do not retain sufficient moisture.

The character of the soils has a certain influence upon the distribution of the trees. The Chanute shales, which have been described as giving rise to sandy soils, support a considerable growth of black jack (*Quercus nigra*), a species that originally covered the larger areas which are otherwise prairie lands, and that still constitutes the principal timber growth on the uplands. The alluvial soils along Neosho River and the larger creeks support a mixed growth of hard woods.

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PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

[Bulletin No. 238.]

The serial publications of the United States Geological Survey consist of (1) Annual Reports, (2) Monographs, (3) Professional Papers, (4) Bulletins, (5) Mineral Resources, (6) Water-Supply and Irrigation Papers, (7) Topographic Atlas of United States—folios and separate sheets thereof, (8) Geologic Atlas of United States—folios thereof. The classes numbered 2, 7, and 8 are sold at cost of publication; the others are distributed free. A circular giving complete lists may be had on application.

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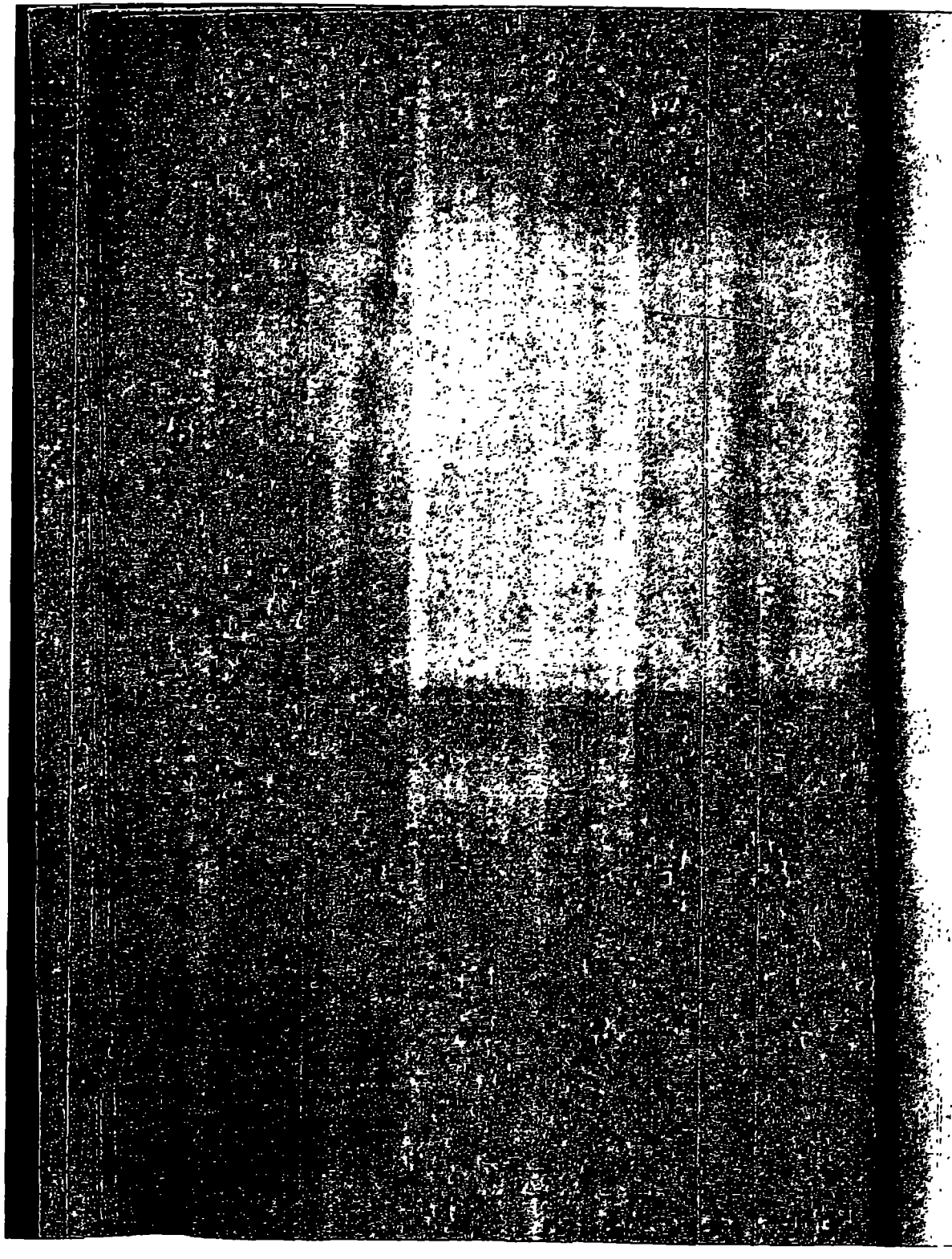

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[TRANSACTIONS OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.]

The Zinc-Smelting Industry of the Middle West.

BY H. C. MEISTER, E.M., ST. LOUIS, MO.

(Lake Superior Meeting, September, 1901.)*

General History.

The zinc-smelting industry of the United States has grown very rapidly in recent years and bids fair to outrival that of all other countries in the future. On account of the geographical situation of the chief ore-supplies, the industry may be divided into two main groups, the eastern and the western.

The eastern and older group includes the works of Pennsylvania, New Jersey and Virginia, which practically control their own ore-supply. The western group includes the works of Illinois, Missouri, Kansas, Wisconsin and Indiana, which do not control their own ore-supply, but are compelled to buy the ore in the open market. It is for this reason that the western zinc-smelting industry has been undergoing continual changes since its inception 40 years ago.

During the early discoveries of lead- and zinc-ore in the lead- and zinc-districts of Wisconsin and northern Illinois, the zinc-ore (smithsonite or "bone" as the miner calls it) had no value and was considered waste; but later, when this ore was found in large quantities, it attracted the attention of metallurgists, which finally resulted, during the early sixties, in the building of the Matthiessen & Hegeler Zinc Works at LaSalle, Ill., the pioneer zinc-works of the West.

A few years later, zinc-ore was discovered associated with the lead-ore in Jefferson county, southeastern Missouri, which started the industry at Carondelet or South St. Louis. Still later, the discoveries of zinc-ore in the lead-ore region, first at Granby and then around Joplin, lead to the introduction of the industry in the southwest Missouri and Kansas districts.

At first the development of the industry was slow, but it progressed steadily and it is now one of the leading metallurgical industries of the middle West.

* Presented at the supplementary session of the Institute in St. Louis, Mo.

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As this paper deals solely with the local zinc-industry the western group only is described. For convenience this group may be subdivided into States according to the progress of the development of the industry, which formerly placed Illinois at the head of the list, then Missouri, and later Kansas and Indiana. This order is now changed and Kansas heads the list, with Illinois second and Missouri third.

In a general way it may be said that after the establishment of the industry at LaSalle, Ill., in the '60's, there were four distinct periods of activity and enlargement followed by corresponding periods of depression. During the early '70's three plants were built at Carondelet, Mo., but after the panic of 1873 business became bad and did not revive until 1879. Activity was renewed in the beginning of the '80's, and many works were built in Kansas and southwestern Missouri. About 1885 a period of depression set in, followed by a very active period of construction during the early '90's. After 1895 a period of dulness occurred, which lasted until 1898, when the activity was once more revived by the building of a number of large plants in the Kansas natural-gas district. Since that time development in this district has been so rapid that a shortage of ore soon occurred. In 1899 the ore-supply was insufficient, and the resultant keen competition caused the price of blende to advance to the unprecedented figure of $54 per ton. The gas-smelters having a strong advantage over the old coal-smelters in the cost of production, the severe competition soon caused the closing down of all the coal-smelters in the Kansas and southwestern Missouri districts. The zinc-ores mined in connection with western silver- and gold-ores, however, soon relieved the shortage, and for the last four years large quantities of blende have been shipped from Colorado to Kansas for treatment in the natural-gas plants.

Production of Metallic Zinc in the United States.

The following statistics[1] show the rapidity with which the production of spelter increased with the application of natural gas.

[1] *Mineral Resources of the United States* for 1892, U. S. Geological Survey.

	Short Tons.		Short Tons.
1895,	76,505	1900,	113,859
1896,	70,933	1901,	130,174
1897,	89,397	1902,	117,541
1898,	107,768	1903,	145,670
1899,	121,246		

An addition of 10,000 short tons for the eastern and southern districts represents the total production of the entire country for the years quoted.

Roasting Zinc-Ore.

Most of the zinc-ore now mined in this district is zinc sulphide or blende, hence a preliminary roasting is necessary in order to get rid of the sulphur. The more thorough the elimination of the sulphur during the roasting, the better the chances are for the recovery of the zinc in the subsequent smelting-operation. Each unit of sulphur left in the roasted ore will hold back double its weight of zinc, and as no sulphur by-products (such as matte) are formed in the smelting-operation, the loss by sulphur means so much waste in the residues which cannot be recovered. A variety of mechanical furnaces are used for roasting, although the old style hand-rabbled reverberatory furnaces are still in use at many plants.

The Hegeler Acid-Furnace.—Many years ago the Hegeler muffle-type of mechanically-rabbled furnace was introduced at the works of Matthiessen & Hegeler, LaSalle, Ill., with entirely successful results, but owing to the high cost of construction and the comparatively high cost of maintenance and operation, it has never been introduced except at works designed to make sulphuric acid from the sulphurous acid-gases. At present the Hegeler furnace is used at the following works: Matthiessen & Hegeler Zinc Co., LaSalle, Ill.; Illinois Zinc Co., Peru, Ill.; United Zinc & Chemical Co., Iola, Kas.; and Grasselli Chemical Co., Cleveland, Ohio.

With the exception of a small plant of the works of the Mineral Point Zinc Co. using the contact-process for making sulphuric acid, the four companies above named are the only manufacturers of acid from blende in the United States, the chamber-process being in general use. The difficulty of finding a market for sulphuric acid in the West has no doubt pre-

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vented its more extended manufacture. The acid market, however, is gradually widening, and no doubt the manufacture of sulphuric acid from blende will become more common.

A new departure in this line of work has lately been made by the Grasselli Chemical Co., which manufactures sulphuric acid from Joplin blende at Cleveland, Ohio, and ships the roasted ore to West Virginia to be smelted with natural gas.

Mechanical Roasting Furnaces.—The roasting of zinc blende in mechanically-stirred reverberatory furnaces marked the first advance in the reverberatory furnace practice. The first successful furnace of this type was the Brown horse-shoe furnace, invented in 1892, and its working gave an entirely new idea to inventors. Furnaces embodying the Brown invention sprang up like mushrooms all over the United States. Among the first to enter the field being the Penree and the Ropp types, but litigation soon stopped their general introduction.

Compared with the ordinary hand-rabbled furnace, mechanical furnaces effect a considerable saving in labor and yield a better and more uniform desulphurization of the ore roasted.

Mechanically-stirred furnaces of the Brown type are in use at the works of the Edgar Zinc Co., at Carondelet, Mo., and Cherryvale, Kas., and at the plant of the Collinsville Zinc Co. at Collinsville, Ill.

Recently, a number of mechanically-stirred furnaces of the Ropp type were in use at the plant of the Lanyon Zinc Co., at Iola, Kas., but these had to be changed to the Cappeau type, in order to avoid an infringement of the Brown patents, the Ropp furnaces having been declared an infringement of Brown's patents.

Smelting Zinc-Ore.

There has been no radical change in the method of smelting zinc-ore. The old style of distillation is still in use, all attempts at direct smelting having resulted in absolute failure.

The Belgian type of furnace is universally used throughout the middle West, either direct-fired or gas-fired, the latter with or without heat-recuperation.

Hegeler "Blow"-Furnace.—The first attempt at gas-firing was made by Matthiessen & Hegeler and resulted in the development of the Hegeler "blow"-furnace. Mr. Hegeler found that by firing with gas, the length of the furnace could be

greatly increased, all that was necessary being to introduce the quantity of gas required to heat the whole furnace and burn it gradually by introducing air at intervals. The Hegeler furnace, as now built, consists of a long rectangular chamber having retorts placed four rows high, and in some cases six; the gases from the producers enter at one end and are discharged at the other. Air for combustion is introduced through iron pipes entering the front of the furnace at various places alongside of the retorts. Both air and gas enter under pressure produced by a positive blast. The producers are operated with a hot top and are placed close to the furnace. No recuperation or regeneration is attempted in the furnace, but the hot gases escaping are used for the generation of steam for power-purposes. These furnaces have been built in size varying from 224 to 504 retorts to the furnace, or from 448 to 1,008 retorts to the block.

Siemens Furnace.—The next attempt at gas-firing was made by the Illinois Zinc Co., at Peru, Ill. This company adopted the Siemens regenerative furnace, built on the well-known principle of the Siemens regenerative system. The Siemens producers, however, proved inefficient and were later replaced by steam-blast producers. The furnaces were originally built with large elliptical retorts, arranged in 3 rows, but lately they have been replaced with circular retorts placed 4 rows high. The latest improvement on these furnaces has been the Neureuther patent, which consists in extending the air- and gas-channels partly up into the center wall, by which both air and gas are admitted into the furnace-chamber at a higher point than was usual. By this means it is claimed that the furnace can be built 5 rows high without detracting from its efficiency. It is also claimed that the furnace is heated more evenly on account of the shorter reach of the flame.

In 1882 the Rich Hill Zinc Works at Rich Hill, Mo., and the Granby Mining & Smelting Co., at Pittsburg, Kas., each built furnaces of the Siemens regeneration principle, which were failures, and were abandoned later. The Rich Hill furnace was built exactly like those of the Illinois Zinc Co., having large elliptical retorts, in three tiers, while the Granby furnace was built with small circular retorts arranged in four tiers.

The failure of the Rich Hill furnace was partly due to mis-

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management and partly to faulty construction. From my own observation the elliptical retorts were entirely too large for the heavy Joplin ore, and the furnace could not be worked "dry" in the required time; consequently the percentage of yield was poor. The Siemens producers required the use of a better grade of fuel which, at that time, was at least five times as expensive as the slack coal burned in the direct-fired furnaces. The most serious mistake, however, was in the arrangement of the gas- and air-channels underneath the checker-work. These channels, not being accessible during the time the furnace was in operation, soon became clogged with zinc oxide which had escaped from leaky retorts. So serious was the interference that an irregularity in the working of the furnace could be detected a few months after the furnace had been put in operation. This clogging caused frequent shut-downs, and instead of having produced a furnace with long campaigns and small repairs, it gave short campaigns and frequent and extensive repairs. In the Granby furnace the circular retorts were better adapted to the work, but the same defects of construction existed as in the Rich Hill furnace and the results were the same.

The high cost of construction of the regenerative furnace and the inability to use the common slack-coal of the district, together with the poor work accomplished on account of faulty construction, soon brought the improved furnace into bad repute; and so prejudicial was the result that no more gas-furnaces were constructed, everybody reverting to the old style of direct-fired furnaces.

Direct-Fired Furnace.—If it had not been for the local cheap slack-coal, other attempts at gas-firing would no doubt have been made, but slack-coal could not be burned to advantage in independent producers, on account of its inferior quality; hence the direct-fired furnace came into general favor. These furnaces were cheap to construct and gave, as a rule, good average results, although the consumption of coal was large and the labor was excessive.

The first direct-fired furnaces built in Kansas had square fronts, and contained 7 rows of 14 retorts each, which amounted to 98 retorts to the furnace, or 196 retorts to the block. Later, the size of the furnace was increased to 16 retorts in a row, set

7 high, corresponding to 112 to the furnace, or 224 to the block, which remained the accepted type until the building of coal-furnaces ceased on account of the extensive discovery of natural gas in Kansas. In 1892 the natural-gas district of Indiana attracted attention, and a plant was built at Marion, followed by one at Ingalls and one at Upland.

Natural-Gas Furnace.—The application of natural gas to the zinc-distillation furnace, however, was not as simple as was at first supposed, and the first attempts for this purpose caused a great deal of worry and anxiety to the operators. The natural-draft furnaces of Indiana, in which a mixture of air and gas, on the principle of the Bunsen burner, was introduced through openings in the front or back of the furnace direct into the furnace-chamber, worked very irregularly. With the narrow channels of the zinc furnace, it seemed impossible to distribute and control the heat properly, and frequent "butchers" or break-downs of the retorts occurred with a correspondingly heavy loss of metal. Consequently, when the industry was started in the natural-gas district of Kansas in 1897, the first thing that suggested itself was to improve the distillation furnace and the method of using the gas. Natural draft was discarded in favor of positive blast. In fact, the Hegeler blow-furnace was copied as near as conditions permitted. In the original form of the natural-gas-fired distilling-furnace, the gas was introduced at one end, in the same manner as in the producer-gas-fired furnace, and the heat regulated by the introduction of air at various places. This arrangement, however, was not satisfactory, for the reason that natural gas, having a high calorific value, was not completely burned in the furnace by the air introduced for this purpose, and, as a result of the incomplete combustion, large quantities of carbon were deposited in the spaces between the retorts which clogged the furnace. In order to insure the complete combustion of the natural gas, and thereby overcome the deposition of carbon, more air was forced in, which, however, caused the furnace to become overheated. A careful study of the requirements indicated a change in the method of introducing the gas and air, so that they would enter jointly at various places through the front. A furnace was then designed which proved satisfactory, but the regulation of the heat of this form of furnace remained a difficult task, and, un-

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less watched very closely, irregularities and frequent breakdowns occur.

The peculiar heat-requirements of a zinc-furnace differ from most other metallurgical furnaces insofar that there is no large space in which to make use of radiant heat. On account of the narrow channels between the numerous rows of retorts the heat must be supplied almost entirely by conduction, which makes it necessary to surround the retorts continually with a flame having the required temperature. As the retorts are easily destroyed by over-heating, an excess of heat must be carefully avoided. The strong cutting-action of a blow-pipe flame, such as is produced in the blow-furnace, easily causes overheating and a consequent destruction of the retorts. It also tends to an early destruction of the lining of the furnace, causing frequent and expensive repairs.

The blow-furnace was first built in sizes of 5 rows of 60 retorts (300 retorts) to the side. Later, the combustion-chamber built at one end was discarded and the space was utilized by adding 20 additional retorts, so that now the accepted size is 5 rows of 64 retorts (320) to the furnace, or 640 to the block. Lately, the tendency has been to limit the number of rows to four, with a corresponding increase in length of the furnace in order to hold the same number of retorts, an arrangement which makes the furnace long, and in some works they have been divided into two transverse sections, placed in tandem in the same building. By working both sections as one furnace, the same economy of labor is retained. While the labor-requirements on these large furnaces is considerably less than on the small direct-fired furnaces, it is also more trying. The men being more exposed to the heat, which causes considerable trouble at times during the hot summer months. In order to avoid the trouble, the Edgar Zinc Co., at Cherryvale, limited each furnace to 5 rows of 20 retorts (100 retorts), or 200 to the block. By placing three blocks in one building, each separated from the other by a 12-ft. space, and operating the three small furnaces as one large one, the same economy of labor is obtained without having the men exposed to the heat as much as they would be with the single large furnaces.

These furnaces are also constructed to operate with natural draft and have proven quite successful. By admitting air and

gas some distance below the lower row of retorts, primary combustion takes place before the gases reach the furnace-chamber proper; and by admitting more air, a secondary combustion takes place in the furnace-chamber, causing a very uniform heat without the deposition of carbon. Thus the cutting-action of the blow-pipe flame is entirely avoided, and repairs have been reduced to a minimum, which allows a long campaign of operation.

Lately, the coal-fired smelting-plant at Girard was removed to Chanute, Kas., to be operated with natural gas. The furnaces are arranged similar to those at Cherryvale, but each furnace has only 80 retorts, or 160 to the block, and the four blocks are placed in one building with each side operated as one furnace. These furnaces are also run by natural draft, similar to those at Cherryvale. Recently, a furnace was constructed at the works of the Prime Western Zinc Co., at Gas City, Kas., using the recuperative principle of the Converse and De Saulles furnace. This furnace is a patented one which was developed at the plant of the New Jersey Zinc Co., at Palmerton, Pa.

The Table I., which may not be strictly accurate, shows the changes that have taken place and the present condition of the zinc-industry.

Smelting in Colorado.—During the past few years the utilization of zinc-blende found associated with silver- and gold-ore in Colorado gave rise to the zinc-smelting industry at Pueblo, Colo. The United States Zinc Co., a branch of the American Smelting & Refining Co., built a plant at Pueblo, during 1903, which is said to be in successful operation now, although numerous obstacles were encountered at first, as is usually the case when opening up a new field.

Retorts for Zinc Distillation.—Circular retorts, used exclusively in the West, vary but little in dimensions at the different works. They are usually about 10.5 in. in external and 8 in. in internal diameter and from 48 to 54 in. long. Formerly they were made by hand, but now they are almost exclusively made by machine, either the ordinary auger-machine or a hydraulic press. The latter type of machine is coming more into use and no doubt is the better of the two; it makes a very dense retort, which prevents leakage of zinc-vapor through its walls. A pressure

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TABLE I.—*Data Relating to the Growth of the Zinc-Industry in the Middle West.*

Year of Construction.	Name of Company	Abandoned. No. of Retorts.	Abandoned. Total.	In Operation. No. of Retorts.	In Operation. Total.
	COAL-BURNING SMELTERS—ILLINOIS.				
1863	Matthiessen & Hegeler Zinc Co., LaSalle			1,311	
1869	Illinois Zinc Co., Peru			1,539	
1875	Lumaghi Zinc Works, Collinsville	210			
1886	Collinsville Zinc Co., Collinsville			1,56	
1892	Waukegan Zinc Works, Waukegan			672	
1891	Winona Zinc Works, Winona			48	
1897	Sandoval Zinc Works, Sandoval		210	672	10,022
	MISSOURI.				
1869	Missouri Zinc Works, Carondelet	1,050			
1872	Mattidale Zinc Works				
	Edgar Zinc Co. (Carondelet)			2,100	
1873	Carondelet Zinc Works				
1881	Joplin Zinc Works, Joplin	1,120			
1882	Rich Hill Zinc Works, Rich Hill			672	
1887	Robert Lanyon, Nevada	1,344			
1896	Geo. E. Nicholson, Nevada		2,464	672	3,344
	KANSAS.				
1874	Weir City Zinc Works, Weir City	1,260			
1878	Robert Lanyon, Pittsburg	1,200			
1881	S. H. Lanyon & Bro., Pittsburg	720			
1882	W. & J. Lanyon, Pittsburg	840			
1882	Granby Mining & Smelting Co., Pittsburg	912			
1888	Scammonville Zinc Works, Scammonville	400			
1886	Girard Zinc Works (old), Girard	448			
1890	Girard Zinc Works (new), Girard	896			
1891	Pittsburg & St. Louis, Pittsburg			80	
1890	Weir City North Works, Pittsburg			1,344	
1895	Chicopee Zinc Co., Cherokee	148			
1894	Midland Smelting Co., Bruce	1,152	8,064		2,240
	Totals		11,702		15,606
	NATURAL-GAS BURNING SMELTERS—INDIANA				
1892	Columbia Zinc Works, Marion	896			
1893	Ingalls Zinc Works, Ingalls	744			
1893	Upland Zinc Works, Upland	560	2,144		
	KANSAS				
1897	Lanyon Zinc Co. (Robert Lanyon Sons Spelter Co., Iola.)				
1898	Lanyon Zinc Co. (Robert Lanyon Sons Spelter Co., La Harpe.)			9,600	
1897	Lanyon Zinc Co. (W. & J. Lanyon, Iola.)				
1898	Prime Western Zinc Co. (Prime Western Z. Co., Gas City.)				
1902	Prime Western Zinc Co. (Nicholson Z. Wks., Iola.)			8,400	
1902	Prime Western Zinc Co. (A. B. Cockerill, Gas City)				
1898	Cherokee-Lanyon Zinc Co., Gas City			2,400	
1898	Edgar Zinc Co., Cherryvale			1,800	
1901	United Zinc & Chemical, Iola			2,400	
1902	Granby Mining & S. Co., Neodesha			2,400	
1903	La Harpe Zinc Co., La Harpe			2,100	
1902	Chanute Zinc Co., Chanute			1,260	
1904	A. B. Cockerill, Altoona			1,800	
1904	Wm. Lanyon, Caney			1,800	37,460
	Total in gas-district		2,144		38,060
	Total in coal-district		11,702		15,606
	Grand total		13,936		56,096

of about 1,000 lb. per sq. in. is used. The capacity of both machines is about equal, but the cost of the hydraulic press plant is ten times that of the auger-machine.

Following the introduction of large furnaces, the method of operating has changed and numerous improvements have been made. Residues are now blown out from the retorts by a stream of water, instead of being scraped out with iron scrapers, as was formerly the practice.

Charging the Ore.—The ore-mixture is prepared outside of the furnace-building, instead of in front of the furnaces as formerly, and the charging is done in tiers instead of rows. The ore and coal are mixed mechanically and the mixture is placed in hopper-shaped charging-cars, from which it is charged into the furnaces. This mixture is usually prepared a day in advance, in order that it shall be ready for use when charging begins.

Drawing the Metal.—The metal is now drawn in large ladles holding from 300 to 400 lb., instead of the former smaller ones holding from 40 to 50 lb. These large ladles are suspended from cranes attached to trucks running on rails in front of the furnace and supplied with protecting-shields. In some cases the ladle is hung to a shield suspended from a single overhead-rail fastened to the furnace-front and traveling the whole length of the furnace.

At present the three sheet-zinc mills in the United States are in the western district. Matthiessen & Hegeler first rolled sheet-zinc in the West, followed by the Illinois Zinc Co.; both having sufficient capacity to roll their entire product of spelter into sheet. In 1902 the Lanyon Zinc Co. built a small mill at La Harpe, Kas., which has since been in constant operation.

MANUFACTURE OF ZINC OXIDE.

While the manufacture of zinc oxide is confined principally to the eastern district, a few establishments are in the West. Generally the requirements for making zinc oxide cannot well be met in the West. In the first place anthracite coal, which is scarce in the West, is necessary, and cannot be had except at prohibitory prices. Oxidized zinc-ores free from cadmium are also necessary. Ores of this character occur in Wisconsin and the large plant of the Mineral Point Zinc Co., a branch of the New Jersey Zinc Co., has been erected at Mineral Point to

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treat these ores. A small plant, started in 1902 at West Plains, Mo., was soon absorbed by the New Jersey Zinc Co., and I believe is now out of commission. A third plant, the Ozark Zinc Oxide Co., built some years ago at Joplin, has so far remained independent, but difficulty was experienced at times in getting proper ore-supplies. At present these are obtained from New Mexico.

The zinc oxide industry will, in all likelihood, be controlled for some time to come by the New Jersey Zinc Co., which has practically an unlimited supply of ore admirably adapted to this purpose and abundant anthracite coal near its plants.

NOTE BY THE SECRETARY.—Comments or criticisms upon all papers, whether private corrections of typographical or other errors or communications for publication as "Discussions," or independent papers on the same or a related subject, are earnestly invited.

SUBJECT TO REVISION.

[TRANSACTIONS OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.]

The Fire-Clays of Missouri.

BY H. A. WHEELER, ST. LOUIS, MO.

(Lake Superior Meeting, September, 1904.*)

THE CLAY INDUSTRY OF THE UNITED STATES.

IT may surprise some of our members to learn, among the industries based on the mineral resources of the United States, that of clay now ranks third, being exceeded in value of product only by pig-iron and coal. The present annual value of clay-products exceeds the value of the outputs of gold and silver, and also exceeds the combined values of copper, lead, zinc, aluminum, mercury, antimony and nickel. These facts are shown in Table I. which gives the statistics for the year 1902:

TABLE I.—*Production of Metals, Coal and Clay in the United States During* 1902.†

	Value
Pig-iron,	$372,775,000
Coal (including anthracite), $76,173,586,	307,032,069
Clay products,	122,169,531
Gold,	80,000,000
Copper,	76,568,954
Petroleum,	71,178,910
Silver (coin-value),	71,757,575
Lead,	22,140,000
Zinc,	14,625,596
Aluminum,	2,284,590
Mercury,	1,407,848
Antimony,	634,506
Nickel,	2,701

NOTE.—The value of the clay-products in the United States in 1903 was $180,962,648.

Of the total amount, $122,169,531 assigned for the value of the clay-products of the United States during 1902, about 20

* Presented at the Supplementary Session of the Institute in St. Louis.

† *Mineral Resources of the United States for* 1902, United States Geological Survey, Washington.

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PRIME WESTERN SPELTER CO. SMELTER WORKS. NO. 1 AND 2

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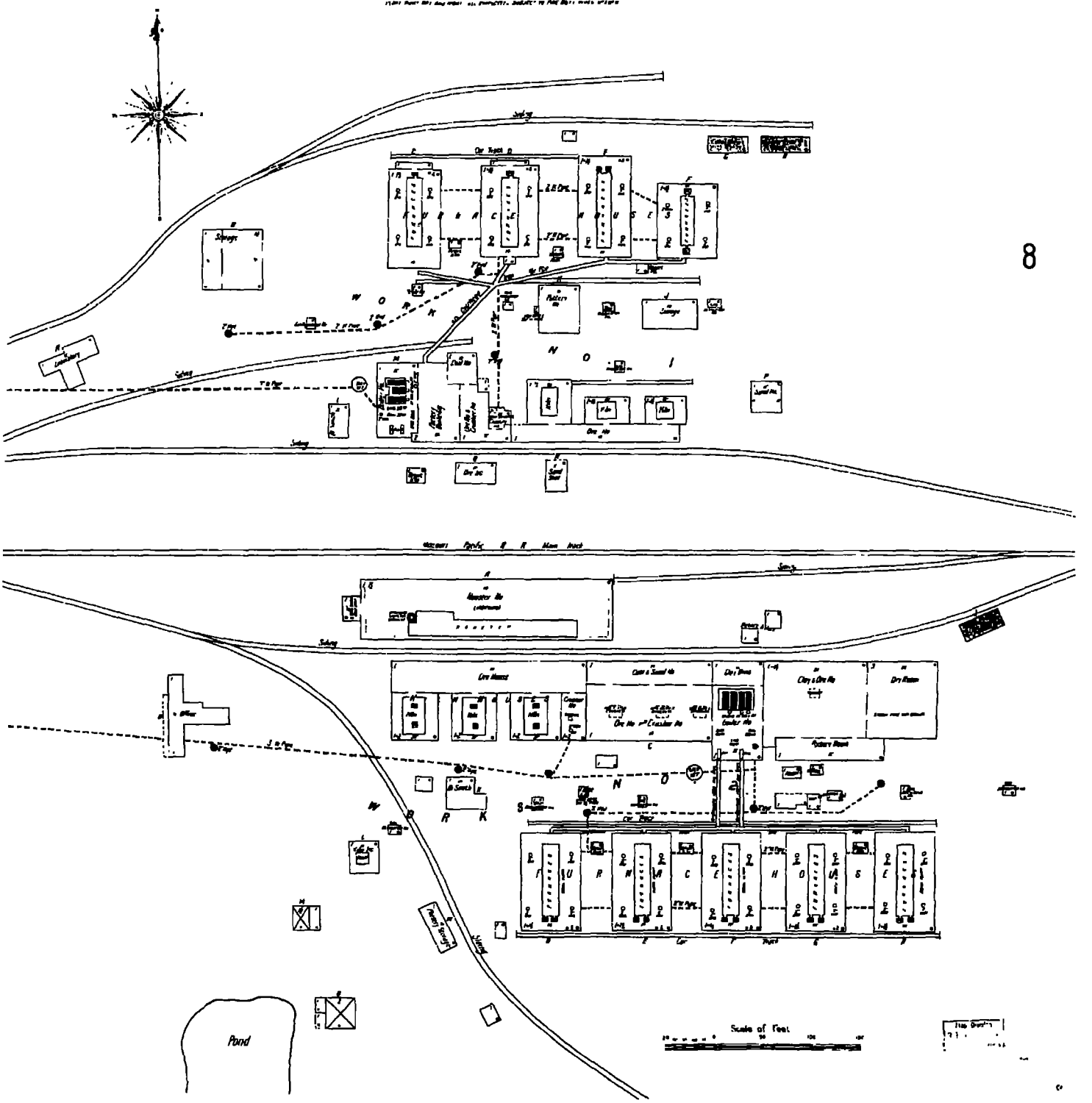

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LEAD AND ZINC

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UNITED STATES

COMPRISING AN ECONOMIC HISTORY OF THE MINING AND SMELTING OF THE METALS AND THE CONDITIONS WHICH HAVE AFFECTED THE DEVELOPMENT OF THE INDUSTRIES

BY

WALTER RENTON INGALLS

Editor of the Engineering and Mining Journal, Editor of The Mineral Industry, Member American Institute of Mining Engineers, Member Institution of Mining and Metallurgy, Member Society of Chemical Industry, Member American Chemical Society, Member American Electrochemical Society, Etc.

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XXIII

COMMERCIAL CONDITIONS

THE commercial history of the zinc industry in the United States is concisely reflected in the statistics, which are available with completeness, in so far as production, imports and exports, and consumption are concerned, back to 1873. These statistics are summarized in the following tables:

PRODUCTION OF SPELTER BY STATES[1]

(In tons of 2000 lb.)

Year	New Jersey and Pennsylvania	Virginia and Tennessee	Total East	Indiana and Colorado	Illinois	Kansas and Oklahoma	Missouri	Total West	Grand Total
1882	5,698		5,698	....	18,201	7,366	2,500	28,067	33,765
1883	5,340		5,340	....	16,792	9,010	5,730	31,532	36,872
1884	7,861		7,861	....	17,594	7,859	5,230	30,683	38,544
1885	8,082		8,082	....	19,427	8,502	4,677	32,606	40,688
1886	6,762		6,762	....	21,077	8,932	5,870	35,879	42,641
1887	7,446		7,446	....	22,279	11,955	8,660	42,894	50,340
1888	9,561		9,561	....	22,445	10,432	13,465	46,342	55,903
1889	10,265		10,265	....	23,860	13,658	11,077	48,595	58,860
1890	9,114		9,114	....	26,243	15,199	13,127	54,569	63,683
1891	8,945	4,217	13,162	....	28,711	22,747	16,253	67,711	80,873
1892	9,582	4,913	14,495	....	*a* 31,383	24,715	16,667	72,765	75,328
1893	8,802	3,882	12,684	....	*a* 29,596	22,815	13,737	66,148	89,686
1894	7,400	1,376	8,776	2,173	26,799	25,588	11,992	66,552	81,499
1895	9,484	3,697	13,181	3,736	31,996	25,775	14,998	76,505	99,980
1896	8,139	2,427	10,566	1,595	34,578	20,759	14,001	70,933	74,399
1897	7,218	3,365	10,583	1,506	36,370	33,396	18,125	89,397	99,980
1898	8,631		8,631	2,654	44,449	40,132	19,533	106,768	115,399
1899	8,805		8,805	4,020	46,098	52,021	18,107	120,246	129,051
1900	8,259		8,259	....	*a* 38,750	62,136	78,806	115,627	123,886
1901	8,603		8,603	....	*a* 44,896	74,240	13,083	132,219	*b* 140,822
1902	12,180		12,180	....	*a* 47,096	86,564	11,087	144,747	*c* 156,927
1903	12,301		12,301	877	*a* 47,659	88,388	9,994	146,918	*d* 159,219
1904	14,893		14,893	4,871	*e* 47,740	107,048	12,150	171,809	*f* 186,702
1905	*c* 23,044		23,044	6,599	45,357	114,948	11,800	178,704	201,748
1906	30,167		30,167	6,260	48,238	129,741	11,088	195,327	225,494
1907	38,060		38,060	5,200	56,103	138,655	11,594	211,552	249,612

[1] Up to 1900, inclusive, the statistics in this table are from Ingalls, Production and Properties of Zinc; 1901–1904, from Mineral Resources of the United States; 1905–

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CONSUMPTION OF ZINC IN THE UNITED STATES

(In tons of 2000 lb.)

Year	Production	Imports			Supply	Exports	Consumption
		Spelter	Sheet	Total			
1873..	7,343	3,420	5,561	8,981	16,324	37	16,287
1874..	10,000	1,797	3,008	4,805	14,805	22	14,783
1875..	15,833	1,017	3,660	4,677	20,510	19	20,491
1876..	16,000	474	2,306	2,780	18,780	67	18,713
1877..	17,500	633	671	1,304	18,804	720	18,084
1878..	19,000	635	628	1,263	20,263	1,273	18,890
1879..	21,000	710	556	1,266	22,266	1,066	21,200
1880..	23,239	4,046	2,035	6,081	29,320	684	28,636
1881..	30,000	1,430	1,364	2,794	32,794	746	32,048
1882..	33,765	9,204	2,207	11,411	45,176	745	44,431
1883..	36,872	8,534	1,655	10,189	47,061	426	46,635
1884..	38,544	2,935	476	3,411	41,955	63	41,892
1885..	40,688	1,758	920	2,678	43,366	51	43,315
1886..	42,641	2,150	546	2,696	45,337	459	44,878
1887..	50,340	4,194	463	4,657	54,997	68	54,929
1888..	55,903	1,913	148	2,061	57,964	31	57,933
1889..	58,860	1,026	507	1,533	60,393	440	59,953
1890..	67,342	1,000	391	1,391	68,733	1,648	67,085
1891..	80,262	404	11	415	80,677	2,147	78,530
1892..	84,082	149	14	163	84,245	6,247	77,998
1893..	76,255	213	14	227	76,482	3,723	72,759
1894..	74,004	194	20	214	74,218	1,804	72,414
1895..	87,591	372	21	393	87,984	1,530	86,454
1896..	81,878	520	14	534	82,412	10,130	72,282
1897..	100,387	1,453	8	1,461	101,848	14,245	87,603
1898..	114,104	1,371	....	1,371	115,475	10,500	104,975
1899..	129,675	1,493	....	1,493	131,168	6,755	124,413
1900..	123,231	1,007	....	1,007	124,238	22,410	101,828
1901..	140,822	388	....	388	141,210	3,390	137,820
1902..	158,237	619	....	619	158,856	3,237	155,619
1903..	158,502	364	....	364	158,866	1,521	157,345
1904..	181,803	467	....	467	182,270	10,073	172,197
1905..	201,748	521	....	521	202,269	5,516	196,753
1906..	225,494	2,204	....	2,204	227,698	4,670	223,028
1907..	249,612	1,778	....	1,778	251,390	563	250,827

In the above table, consumption has been computed without taking into account the difference in stocks of metal on hand at the beginning

1907, from The Mineral Industry. The statistics in the fourth column are the production of Indiana up to 1899; of Colorado from 1903 onward. (*a*) Including Indiana. (*b*) Including 2716 tons of dross spelter. (*c*) Including 2675 tons of dross spelter. (*d*) Including 3302 tons of dross spelter. (*e*) Including West Virginia, whose spelter is produced from Joplin ore. (*f*) Including 3300 tons of dross spelter.

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and end of each year, statistics for which are unavailable over the whole period covered by the table.

PRODUCTION OF ZINC OXIDE IN THE UNITED STATES

Year	Quantity		Value, f.o.b. Works		Tenor in Zinc at 80%	
	Short Tons	Metric Tons	Total	Per Short Ton	Short Tons	Metric Tons
1880..	10,107	9,172	763,738	$75.38	8,086	7,338
1881..	10,000	9,083	700,000	70.00	8,000	7,266
1882..	10,000	9,083	700,000	70.00	8,000	7,266
1883..	12,000	10,899	840,000	70.00	9,600	8,719
1884..	13,000	11,797	910,000	70.00	10,400	9,438
1885..	15,000	13,625	1,050,000	70.00	12,000	10,900
1886..	18,000	16,344	1,440,000	80.00	14,400	13,075
1887..	18,000	16,344	1,440,000	80.00	14,400	13,075
1888..	20,000	18,149	1,600,000	80.00	16,000	14,519
1889..	16,970	15,390	1,357,600	80.00	13,576	12,312
1890..	*20,000	*18,140	1,600,000	*80.00	*16,000	*14,512
1891..	23,700	21,496	1,600,000	67.51	18,960	17,197
1892..	27,500	24,946	2,200,000	80.00	22,000	19,957
1893..	25,000	22,678	1,875,000	75.00	20,000	18,142
1894..	22,814	20,697	1,711,275	75.00	18,251	16,554
1895..	22,690	20,498	1,588,300	70.00	18,152	16,398
1896..	15,863	14,391	1,189,725	75.00	12,690	11,513
1897..	26,262	23,825	1,686,020	64.20	21,010	19,060
1898..	32,747	29,708	2,226,796	68.00	26,198	23,766
1899..	39,663	35,982	3,331,692	84.00	31,730	28,786
1900..	47,151	42,775	3,772,080	80.00	37,721	34,220
1901..	46,500	42,266	3,720,000	80.00	37,200	33,813
1902..	52,730	46,929	4,023,299	76.30	42,184	37,543
1903..	59,562	54,034	5,005,394	83.69	47,650	43,227
1904..	59,613	54,081	4,523,414	75.88	47,690	43,265
1905..	65,403	59,349	5,232,240	80.00	52,322	47,479
1906..	77,800	70,573	6,257,361	80.43	....	....
1907..	85,390	77,449	7,731,100	90.54	....	....

The statistics of production and price in the above table from 1880 to 1892, both years inclusive, are from the reports of the U. S. Geological Survey. Apparently the figures for 1881–1888 are approximate estimates rather than totals based on reports from the producers. The statistics from 1893 to 1906, both years inclusive, are as reported by The Mineral Industry. The figures marked with an asterisk are estimated.

The production for 1906 and 1907 includes zinc-lead pigments, and consequently is not strictly comparable with the figures for the previous years.

The production of zinc oxide in the United States, with the exception of an insignificant quantity, is made directly from ore, whereas the oxide produced in Europe is obtained by the combustion of spelter, its manufacture in that way constituting one of the important channels of Euro-

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pean spelter consumption. In considering the relative importance of the United States as a zinc-producing country, therefore, its production of zinc oxide, reduced to the basis of its tenor in metallic zinc, should be added to the production of spelter.

CONSUMPTION OF ZINC WHITE IN THE UNITED STATES

(In tons of 2000 lb.)

Year	Production	Imports	Supply	Exports	Consumption	Tenor in Zinc at 80%	
						Short tons	Metric tons
1894..	22,814	1,686	24,500	nil	24,500	19,600	17,777
1895..	22,690	2,273	24,963	24	24,939	19,951	18,096
1896..	15,863	2,286	18,149	2,324	15,825	12,660	11,483
1897..	26,262	2,782	29,044	1,859	27,185	21,748	19,725
1898..	32,747	1,671	34,418	3,925	30,493	24,394	22,125
1899..	39,663	1,506	41,169	5,343	35,826	28,661	25,995
1900..	47,151	1,309	48,460	5,656	42,804	34,243	31,060
1901..	46,500	1,600	48,100	4,561	43,539	34,831	31,607
1902..	52,730	1,636	54,366	5,358	49,008	39,206	35,577
1903..	59,562	1,743	61,305	7,215	54,090	43,272	39,267
1904..	59,613	1,293	60,906	8,157	52,749	42,199	38,293
1905..	65,403	1,718	67,121	11,280	55,841	44,673	40,538
1906..	77,800	2,100	79,900	15,578	64,322	....	....
1907..	85,390	2,656	88,046	13,256	74,790	....	....

Previous to 1886 the only available statistics of American imports and exports of zinc white are for fiscal years ending June 30, which are of course useless for comparison with the production reported for calendar years.

The imports entered in the above table represent only dry zinc oxide, besides which a small quantity of zinc oxide ground in oil is brought into the United States.

Previous to 1897 the exports reported above include zinc ores, corresponding to "oxide and ore" of the U. S. Bureau of Statistics enumeration. There was, however, but little ore exported before 1897, when large shipments from New Jersey first began to be made.

The imports of zinc white into the United States and the supply from 1885 to 1894 were as follows (in tons of 2000 lb.):

Year	1886	1887	1888	1889	1890	1891	1892	1893
Production	18,000	18,000	20,000	16,970	20,000	23,700	27,500	25,000
Imports	1,763	2,481	701	1,343	1,316	1,410	1,221	1,950
Supply	19,763	20,481	20,701	18,313	21,316	25,120	28,721	26,950

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Production of Zinc Ore in the United States

There are no complete statistics of the production of zinc ore in the United States, but the output of the most important districts, namely, New Jersey and Kansas-Missouri, is reported satisfactorily, the former by the New Jersey Geological Survey and the latter by the local journals, the reports of which are summarized regularly by The Mineral Industry. The statistics of the production of those two districts are presented in the following table:

Production of Zinc Ore in the Most Important Districts of the United States

(In tons of 2000 and 2240 lb.)

Year	a. New Jersey	b. Kansas Missouri	Year	a. New Jersey	b. Kansas Missouri	Year	a. New Jersey	b. Kansas Missouri	Year	a. New Jersey	b. Kansas Missouri
1881	49,178	58,200	1888	46,377	102,350	1895	c	144,487	1902	209,386	262,545
1882	40,138	60,300	1889	56,154	106,750	1896	78,080	155,333	1903	279,419	234,873
1883	56,085	63,700	1890	49,618	122,850	1897	76,973	177,976	1904	250,025	267,240
1884	40,094	74,300	1891	76,032	145,550	1898	99,419	234,455	1905	323,062	252,435
1885	38,526	74,000	1892	77,298	154,800	1899	154,447	255,088	1906	361,330	280,062
1886	43,877	85,400	1893	55,852	139,770	1900	194,881	248,446	1907	329,205	286,589
1887	50,220	98,300	1894	59,382	147,310	1901	191,221	258,306	..	....	....

(*a*) tons of 2240 lb. (*b*) production of Joplin district only, tons of 2000 lb.; in addition to the production in the Joplin district there is a small output in southeastern Missouri.

The only statistics of zinc ore production in other parts of the United States, which are available, are very incomplete. According to The Mineral Industry, vol. II, the production of zinc ore in Virginia and Tennessee was 8420 tons in 1887, 11,500 in 1888, 12,906 in 1889, 14,969 in 1890, 20,287 in 1891, 20,295 in 1892, and 21,000 in 1893. According to recent volumes of The Mineral Industry there was a production of 3799 tons of blende in Tennessee in 1899, and 3968 in 1900. The production of zinc ore in Wisconsin, chiefly blende, was reported to have been 15,000 tons in 1900. Since 1898 there has been a large and increasing production of zinc ore in Colorado. The output of that State in 1900 was reported by H. A. Lee, State Commissioner of Mines, as having amounted to 77,984 tons of ore, averaging 42% Zn. That total undoubtedly includes, however, the ore that was consumed for the manufacture of zinc-lead pigment at Cañon City, Colo., and for the manufacture of zinc white at Mineral Point, Wis.

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EXPORTS OF ZINC ORE FROM THE UNITED STATES

Year	Short Tons	Total Value	Value per Ton	Metric Tons
1897.....	9,251	211,350	$22.85	8,391
1898.....	11,782	299,870	25.54	10,686
1899.....	28,221	725,944	25.72	25,602
1900.....	42,062	1,133,570	26.95	38,150
1901.....	44,146	1,167,684	26.45	40,040
1902.....	55,733	1,449,104	26.00	50,550
1903.....	39,411	987,000	25.04	35,746
1904.....	35,911	905,782	25.22	32,571
1905.....	30,946	848,451	27.41	28,068
1906.....	27,720	733,300	26.45	25,142
1907.....	20,351	579,490	28.47	18,462

There were occasional exports of zinc ore from the United States previous to 1897, but they were not reported separately in the official statistics. The quantity was not large in any year.

STATISTICS OF PRICE

The chief markets of the world, wherein the prices which govern the zinc industry are established, are New York, St. Louis, London, and Breslau. The price made in London practically governs the industry in Europe, although the business in Upper Silesia is transacted on the basis of the price at Breslau; the latter generally preserves, however, a certain relation to the London price. In the United States the business is transacted chiefly on the basis of the price of spelter at St. Louis. The New York price corresponds with the St. Louis price, plus the difference in the cost of transportation to the two points. That difference is not merely the freight rate from St. Louis to New York, but is the variation between the rates from Kansas smelting points to New York and St. Louis respectively. The difference between the New York and St. Louis prices at present is $0.15 per 100 lb. The difference between the New York and St. Louis price varies consequently from time to time according to the freight rates, but for many years it has been quite steadily $0.15.

Although the importation of spelter into the United States from Europe is practically prohibited by the tariff of 1.5 c. per lb., and the American price of spelter is consequently to a considerable extent independent of the European price, there is nevertheless at many times an intimate relation between the prices of the two Continents, because of the ability of American producers to export zinc at a profit under certain conditions. The freight rate on spelter from Kansas smelting points to Liverpool ranges from $0.25 to $0.40 per 100 lb. (it has been as low as $0.22 per 100 lb.). Consequently, if at any time the price of spelter at London rises materially above the price at New York, the exportation

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of spelter from Kansas to Europe tends to reduce the European price to the American level, or vice versa to cause the American price to rise to the European level.

The average monthly price of spelter at New York and the average annual price at London and in the principal markets of Germany, for a long period of years, are give in the subjoined tables. The New York prices are as given in The Mineral Industry; the authorities for the English and German prices are stated in each case.

AVERAGE MONTHLY PRICE OF PRIME WESTERN SPELTER AT NEW YORK

(In cents per lb.)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1875.	6.56	6.46	6.35	6.75	7.20	7.20	7.30	7.175	7.175	7.275	7.275	7.275	7.00
1876.	7.50	7.625	7.685	7.80	7.875	7.625	7.185	7.125	6.96	6.685	6.495	6.435	7.25
1877.	6.375	6.56	6.435	6.31	6.125	5.995	5.745	5.85	5.81	5.80	5.745	5.625	6.03
1878.	5.625	5 435	5.435	5.125	4.81	4.435	4.625	4.685	4.81	4.66	4.625	4.31	4.88
1879.	4.375	4.51	4.495	4.50	4.375	4.245	4.56	5.21	5.81	6.185	6.06	6.125	5.036
1880.	6.185	6.56	6.625	6.31	5.81	5.31	4.935	5.06	4.935	4.935	4.775	4.70	5.51
1881.	5.06	5.185	4.935	4.935	5.935	4.875	4.875	5.06	5.215	5.31	5.685	5.935	5.243
1882.	5.875	5.685	5.495	5.375	5.435	5.31	5.245	5.31	5.245	5.245	4.995	4.685	5.325
1883.	4.56	4.56	4.685	4.675	4.625	4.495	4.40	4.35	4.45	4.40	4.385	4.36	4.495
1884.	4.285	4.325	4.50	4.575	4.525	4.455	4.50	4.57	4.56	4.475	4.35	4.125	4.443
1885.	4.31	4.275	4.21	4.21	4.175	4.05	4.25	4.50	4.56	4.56	4.525	4.525	4.345
1886.	4.40	4.455	4.55	4.55	4.50	4.375	4.35	4.35	4.325	4.275	4.275	4.425	4.40
1887.	4.55	4.55	4.475	4.45	4.55	4.55	4.575	4.55	4.50	4.525	4.775	5.40	4.625
1888.	5.425	5.35	5.10	4.85	4.65	4.55	4.55	4.75	4.975	5.05	4.90	4.875	4.91
1889.	5.00	4.95	4.75	4.675	4.75	4.975	5.10	5.20	5.175	5.10	5.20	5.40	5.023
1890.	5.41	5.28	5.187	5.085	5.35	5.575	5.55	5.275	5.06	6.012	6.122	6.106	5.55
1891.	5.55	5.025	5.125	5.00	4.85	5.083	5.063	5.01	4.958	5.02	4.83	4.75	5.02
1892.	4.69	4.62	4.89	4.68	4.79	4.71	4.78	4.69	4.53	4.41	4.47	4.40	4.63
1893.	4.39	4.33	4.28	4.38	4.41	4.27	4.13	3.89	3.69	3.68	3.65	3.80	4.075
1894.	3.56	3.85	3.89	3.62	3.47	3.40	3.43	3.38	3.44	3.45	3.36	3.43	3.52
1895.	3.28	3.20	3.23	3.30	3.50	3.65	3.75	4.15	4.30	4.10	3.55	3.49	3.63
1896.	3.75	4.03	4.20	4.09	3.98	4.10	3.97	3.76	3.60	3.72	3.99	4.14	3.94
1897.	3.91	4.02	4.12	4.13	4.21	4.21	4.32	4.26	4.18	4.17	4.03	3.89	4.12
1898.	3.96	4.04	4.25	4.26	4.27	4.77	4.66	4.58	4.67	4.98	5.29	5.10	4.57
1899.	5.34	6.28	6.31	6.67	6.88	5.98	5.82	5.65	5.50	5.32	4.64	4.66	5.75
1900.	4.65	4.64	4.60	4.71	4.53	4.29	4.28	4.17	4.11	4.15	4.29	4.25	4.39
1901.	4.13	4.01	3.91	3.98	4.04	3.99	3.95	3.99	4.08	4.23	4.29	4.31	4.08
1902.	4.27	4.15	4.28	4.37	4.47	4.96	5.27	5.44	5.49	5.38	5.18	4.78	4.84
1903.	4.87	5.04	5.35	5.55	5.63	5.70	5.66	5.73	5.69	5.51	5.39	4.73	5.40
1904.	4.863	4.916	5.057	5.219	5.031	4.760	4.873	4.866	5.046	5.181	5.513	5.872	5.100
1905.	6.190	6.139	6.067	5.817	5.434	5.190	5.396	5.706	5.887	6.087	6.145	6.522	5.882
1906.	6.487	6.075	6.209	6.087	5.997	6.096	6.006	6.027	6.216	6.222	6.375	6.593	6.198
1907.	6.732	6.814	6.837	6.685	6.441	6.419	6.072	5.701	5.236	5.430	4.925	4.254	5.962

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The price of spelter has been subject to wide fluctuations, especially in the United States, where the range has been from 7.875 c. (the average for May, 1876) to 3.20 c. (the average for February, 1895).[1] The maximum price was attained at a time when the market was controlled by a combination of producers which was organized for the purpose of enhancing the value of spelter and was temporarily successful in doing so. The minimum price was quoted during the period of depression which followed the panic of 1893.

The decline in the price of spelter which began in 1874 and continued, with only two checks, until 1885 is attributable chiefly to the new supply of rich ore that in 1870 began to be offered in the form of blende. At about the same time the United States began to be an important producer of zinc, its importations from abroad dwindled down, and this outlet for European spelter gradually became closed. Simultaneously there was a heavy increase in the world's production. Up to 1870 the spelter product of Europe was derived almost exclusively from calamine. Blende had been mined and smelted in Belgium as early as 1845, but the output of that Kingdom never attained much magnitude. The Belgian production of calamine had been on the wane since 1856. In 1870 the Scharley and Marie mines, which had previously been the most important producers in Upper Silesia, came to the end of their resources, but in the same year the blende of the district began to be utilized, although its production did not assume large proportions until nearly 10 years later.

The abnormally high prices for spelter in the United States in 1875 and 1876 were to a large extent artificial, being due to the manipulations of a combination of the Western producers, which was formed in the spring of 1875. In April, 1876, it succeeded in raising the nominal price of spelter to 8 c., New York, but production had been stimulated, consumption restricted and stocks accumulated, so that in June, 1876, the combination was practically disrupted, this being followed by a rapid decline in the price. In 1879 and 1882 syndicates to control production and price were organized in Europe, but their efforts were of only temporary effect on the market, which continued to sag under the weight of the heavy production. During the decade 1881–1890 the exports of spelter from Europe to the United States again became of considerable importance, attaining a maximum of 11,411 short tons in 1882 (in which year the American production was 33,765 tons), but since 1887 foreign spelter has ceased to be of any consequence in the American market. In 1888 there was formed in Europe a combination of the French, German, and British producers to restrict production, which went into effect in 1889 and continued to the end of 1894. This was probably the best-sustained effort to regulate the price of spelter, but although it had a

[1] In February, 1895, spelter at one time touched 2.90 c. at St. Louis.

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temporary influence on the market it could not prevent production by new concerns, who were led into the business by the attraction of high prices and large profits, and its ends were thus defeated.

Since 1890 the predominant features in the zinc market have been the sagging of prices under increasing production in the early part of the decade; the enormously increasing production in the United States and the beginning (in 1896) of large exports to Europe; the decrease in the cost of smelting in the United States because of the utilization of the natural gas resources of Kansas and improvements in the metallurgical practice; and the increase in the cost of smelting in Europe because of the rise in the value of coal, especially toward the end of the decade. There was a period of industrial depression in both Europe and America in 1893 to 1895; and a recovery, which culminated in a boom in 1899 and the early part of 1900; followed by a depression in Europe, which caused a great decline in the price of spelter there, and sympathetically a corresponding decline in the price in the United States, although the period of general industrial prosperity continued here, save for a temporary setback in 1901 and 1903. It will be observed, from the accompanying table how since 1890 the American price for spelter has preserved a rather constant relation to the European price, although spelter in Europe can no longer, under normal conditions, enter the American market. Beginning in 1905, and continuing up to the early part of 1907, there was another period of great industrial activity, creating increased demand for spelter, which again carried prices to a high level.

AVERAGE ANNUAL PRICE OF SPELTER IN NEW YORK AND LONDON, REDUCED TO CENTS PER POUND

Year	New York	London	Year	New York	London
1871	....	4.008	1889	5.023	4.299
1872	....	4.881	1890	5.550	5.048
1873	....	5.691	1891	5.020	5.049
1874	....	4.973	1892	4.630	4.527
1875	7.000	5.232	1893	4.075	3.783
1876	7.250	5.068	1894	3.520	3.359
1877	6.030	4.333	1895	3.630	3.175
1878	4.880	3.888	1896	3.940	3.608
1879	5.036	3.609	1897	4.120	3.803
1880	5.510	3.989	1898	4.570	4.443
1881	5.243	3.538	1899	5.750	5.405
1882	5.325	3.693	1900	4.390	4.407
1883	4.495	3.329	1901	4.070	3.702
1884	4.443	3.140	1902	4.840	4.321
1885	4.345	3.043	1903	5.400	4.560
1886	4.400	3.097	1904	5.100	4.913
1887	4.625	3.302	1905	5.882	5.529
1888	4.910	3.932	1906	6.198	5.869

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AVERAGE MONTHLY PRICE OF ZINC BLENDE ORE AT JOPLIN, MO.

(Price per 2000 lb. of Ore in Producers' Bins)

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	12 mos.
1896	$24.00	$23.50	$23.00	$23.00	$21.50	$21.00	$21.50	$21.00	$20.00	$20.50	$23.50	$25.50	$22.33
1897	22.125	21.50	21.00	21.125	21.60	21.875	22.50	22.50	22.625	22.75	23.50	24.25	22.28
1898	23.00	22.50	23.00	24.62	26.50	28.50	28.00	28.37	31.00	33.70	36.25	37.00	28.44
1899	32.25	43.37	43.40	51.50	50.50	45.50	44.20	45.00	43.75	43.50	35.00	36.00	38.54
1900	30.23	29.36	28.45	28.42	26.92	25.00	24.23	25.67	24.25	24.25	24.45	25.40	26.50
1901	23.73	23.96	23.70	24.58	24.38	24.22	24.68	23.88	22.82	21.63	26.15	28.24	24.21
1902	26.75	27.00	28.00	28.55	20.23	34.10	34.37	32.50	33.58	33.58	32.10	29.25	30.73
1903	34.50	32.50	35.75	37.75	36.60	36.50	36.00	36.90	34.40	34.40	30.75	30.00	34.44
1904	32.12	34.00	36.00	36.40	34.63	32.62	35.00	37.00	40.40	40.00	44.25	46.13	37.40
1905	51.94	53.65	47.40	43.93	43.74	40.75	43.00	50.24	46.80	49.37	50.37	47.67	47.40
1906	49.33	49.25	45.60	44.00	41.50	44.20	43.88	44.38	43.20	42.50	44.43	45.55	44.82
1907	46.90	48.30	49.75	49.25	46.90	47.00	46.80	44.56	41.00	41.75	38.60	31.50	44.36

The statistics of the above table are taken from various volumes of The Mineral Industry with the exception of those for 1900 and 1901, for which years the values reported by the U. S. Geological Survey have been adopted. The Mineral Industry and the U. S. Geological Survey agree as to the values for the years 1896–1899, both inclusive. There are no complete statistics available for the years previous to 1896. The Mineral Industry reports the following averages: 1889, $25; 1890, $23.90; 1891, $25.90; 1892, $22.50; 1893, $19.25; 1894, $17.10. The Mineral Industry made no quotation for 1895; Prof. Erasmus Haworth, State Geologist of Kansas, gives the average for that year as $19.68. In the earlier years the figures represent the value of the average grade of ore marketed. Since 1899 they represent the average value of ore assaying 60% zinc.

In the early part of the decade 1890–1900 the average grade of the ore produced in the district was probably between 56% and 58% Zn; certainly not more than 58%. About 1900 the average was probably very close to 60%, which is rated as the "standard" ore of the district. A good deal of ore assaying 62% to 63% Zn is produced, and occasionally lots assaying as high as 64.5%. During the last four or five years the average grade has been about 58% zinc, which is representative of the present production.

The zinc mining and smelting industry of the United States has experienced many consolidations, but nothing approaching the organization of a trust, although such has several times been attempted. The ownership of the producing mines is so widely scattered that anything like securing control of the ore supply has been out of the question, and that being the case it has been too easy a matter to build new and competing smelting works to make the purchase of the existing works, at the high

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prices demanded for many of them, a safe venture, which has been perceived even by the most reckless capitalists.

In 1896 many of the smelteries of Kansas and Missouri were consolidated by the Cherokee-Lanyon Spelter Co., but a new lot of works immediately sprang up, and in 1901 the competition of smelters in the gas field, into which the Cherokee-Lanyon company had been slow to enter, practically put the latter out of business after a brief, unsuccessful career, with a lot of worthless old works on its hands. In 1896 also was organized the New Jersey Zinc Co., which has elsewhere been referred to. This company is often called the "zinc trust," but it is not a trust, being simply a very big, very rich, and very successful corporation. However, it is a trust in so far as it controls the production of zinc oxide, which is done through technical experience and trade prestige, and in the Eastern market only by control of the ore supply. Also the New Jersey Zinc Co. has control of the production of high-grade spelter, a comparatively small business, which is also by possession of the sole ore supply. In 1899 another group of Kansas smelters was consolidated by the Lanyon Zinc Co., and in 1902 still another group was purchased by the Prime Western Spelter Co., a subsidiary of the New Jersey Zinc Co., but as fast as works were bought up others sprang up and the only result was to introduce these large companies into the business and to some extent effect concentrations of interest, which on the whole was probably to the general advantage of the zinc industry.

Previous to 1876 the domestic production of spelter was far from adequate to supply the demand. In that year the imports, both of spelter and sheet, dwindled into insignificance. In 1880–1883 there were again rather large imports, which were due to the offerings of European smelters at low prices. Since 1883 American smelters have had control of the home market, the importations having been of no particular consequence in any year. Since 1890 there has been a steady exportation of a small quantity of high-grade Virginia and New Jersey spelter. Early in the nineties the Western smelters also began to export their surplus metal at times of depression in the home market, and thus served back the Europeans precisely as they had formerly operated in the American market.

The position of zinc in the tariff laws has been as follows:

In the Act of May 2, 1792, lapis calaminaris — calamine — was put on the free list. It continued on the free list until the Act of Aug. 30, 1842, when through an oversight (probably) it was unenumerated and therefore fell under the "catch-all" clause which fixed a duty of 20% ad valorem. In the same Act, "teuteneque" (spelter) was specifically made free of duty, wherefore it could hardly have been intended to make calamine dutiable. However, in the Act of July 30, 1846, calamine,

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under that name, was made dutiable at 20% ad valorem, which was peculiar, inasmuch as in the same act the rate on spelter was only 5%. The Act of March 3, 1857, reduced the duty to 15%. The Act of March 2, 1861, put calamine on the free list, where it has remained in every subsequent tariff.

Nowhere in any tariff law is zinc ore mentioned except as calamine. For 100 years the matter was of no consequence. There were occasional small importations of calamine, but they were of utter insignificance. Then a hot contest arose over the position of zinc ore under the terms of the Dingley tariff. This originated with the importation of a considerable quantity of blende from British Columbia in 1902, which increased in following years. The purchasers entered this as silver ore, free of duty, or as lead ore, paying duty on the small lead content. In 1905 the smelters of Kansas began to make large imports of calamine from Mexico. The producers of zinc ore in Missouri becoming alarmed at this foreign competition sought to put a stop to it. They first induced the Treasury department to order that blende be assessed at 20% ad valorem, under the clause in the tariff, covering metallic mineral substances, not elsewhere specified, which was effectual in excluding the Canadian ore, and then secured another order defining calamine as hydrous silicate of zinc only, which would have excluded much of the Mexican ore, the latter being chiefly carbonate. At this the smelters entered a protest, the supply of Mexican ore being abundant and especially desirable. The outcome of the matter is well summed up in the following paragraphs from an editorial in the *Engineering and Mining Journal* of Feb. 16, 1907:

"In the matter of the protests of various smelters against an order fixing a duty on zinc ore a decision was made, February 5, by the Board of General Appraisers. By an order of the Secretary of the Treasury, Feb. 10, 1906, it was held that the term 'calamine' in the Dingley Tariff referred only to the hydrous silicate of zinc, and that sulphide and carbonate ores were dutiable at the rate of 20% ad valorem. The Board of General Appraisers has completely reversed the Treasury interpretation of the law, its conclusion being that the carbonates and silicates of zinc are included within the meaning of the term calamine, as used in the Dingley Act, and consequently are free of duty, while the sulphide of zinc is also free under paragraph 614 as a crude mineral not advanced in value by any process of manufacture, subject to the qualification that any lead contents of these ores are dutiable at the rate of 1.5 c. per lb., as prescribed in paragraph 181.

"The decision as to calamine was a foregone conclusion, inasmuch as anything different would have violated the accepted commercial and metallurgical practice of a century, as was done ignorantly in the Treasury order of Feb. 10, 1906. The fact that mineralogists had a more recent

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and more restricted meaning for this term, or rather some mineralogists, because among mineralogists there were confusion and difference over the matter, could not rationally be allowed to supersede the preëmption of the term by metallurgists, who had never abandoned it from their common usage or lost their understanding of it. The surprising thing is that the Government should have considered it had any ground for contest on this point.

"Commercially this is the more important part of the recent decision, inasmuch as the bulk of the importations heretofore have been of calamine, but the more remarkable part is that which relates to blende. It is to be admitted that when the Dingley Law was enacted no one thought that in a few years the United States would be importing zinc blende, and when such importations were begun there was ground for the belief that blende fell under the 'catch-all' paragraph, providing that 'metallic mineral substances' in a crude state, not elsewhere specified, should be dutiable at 20% ad valorem, as the Secretary of the Treasury ordered. Now the Board of General Appraisers, guided by a decision of the Circuit Court of Appeals in what is considered to be a parallel case, holds that the phrase, 'metallic mineral substances' applies only to that class of mineral substances in which metal appears in a free state, such as the ores of gold, silver, and copper. Inasmuch as the only ores of the above character which are of commercial importance are those of gold, silver, and copper, and they are specifically on the free list, this clause in the Dingley Act under the recent decision becomes meaningless."

The producers of zinc ore carried the case to the U. S. Circuit Court, which on April 22, 1908, upheld the decision of the Board of General Appraisers.

The first mention of metallic zinc is in the tariff act of April 27, 1816, wherein "zinc, teutenague or spelter" is admitted free of duty. It continued on the free list until the Act of July 30, 1846, when spelter was made dutiable at the rate of 5% ad valorem, and sheet zinc at 15%. The Act of March 3, 1857, reduced the duty on spelter to 4% and that on sheet zinc to 12%. Four years later, by the Act of March 2, 1861, the duty on spelter was fixed at 1 c. per lb. and that on sheet at 1.5 c. per lb. It is to be observed that this increase in the rate was practically coincident with the beginning of spelter production in the United States. In the Act of July 14, 1862, the rate on spelter was 1.25 c. per lb.; on sheet zinc, 2 c. per lb. The Act of June 30, 1864, further raised the rates to 1.5 c. and 2.25 c. respectively. These rates were reduced 10% by the Act of June 6, 1872, but the reduction was repealed in the Act of March 3, 1875. The rates of 1.5 c. on spelter and 2.25 c. on sheet zinc were continued in the Act of March 3, 1883, but in the McKinley tariff, Act of Oct. 1, 1890, they were raised to 1.75 c. and 2.5 c. per lb. respectively, and were

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then reduced to 1 c. and 1.25 c. respectively by the Act of Aug. 27, 1894. Finally, the Dingley Act, July 24, 1897, raised the rate on spelter to 1.5 c. and that on sheet zinc to 2 c. per lb.

In the zinc industry of the United States, the labor question has been destitute of striking features. The zinc mining and smelting districts have been remarkably free from strikes and disturbances. The only embarrassing factor in this particular has been the strikes in the coal mines of Kansas, which frequently cut off the fuel supply of the smelters and thereby checked spelter production and created market disturbances. The transfer of the smelting industry to the natural gas field eliminated this source of trouble. Both in the mining and smelting districts the conditions of living have been very favorable and the supply of labor has been abundant and comparatively cheap. For many years the average wage in the smelting works was about $2 per day, while miners in the Joplin district received $2 per day, and common labor all around was paid $1.50 per ten hours. Since 1903 the increased demand for labor has materially increased the rates of wages, both at mines and smelters, but particularly at the former.

As illustrative of the increase in wages in southwestern Missouri the following data from the records of the Granby Mining and Smelting Co., which I owe to the courtesy of Mr. Elias S. Gatch, are interesting. Previous to 1893 the wages paid to miners at Granby were $0.75 to $1.25 per day. From 1895 to 1898, they were $1.25 to $1.75. In 1899–1903 they had risen to $1.75 to $2; and in 1903–1906 to $2 to $2.50. The rate of wages at Granby is usually 25 to 50 c. per day lower than at Joplin.

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DOCUMENT INFO

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Filename: 1908 NJZ Officers.pdf

DOCUMENT INFO

THE MANUAL OF STATISTICS

STOCK EXCHANGE HAND-BOOK

1908

THIRTIETH ANNUAL ISSUE

RAILROAD SECURITIES · INDUSTRIAL SECURITIES
GOVERNMENT SECURITIES STOCK EXCHANGE QUOTATIONS
MINING · GRAIN AND PROVISIONS · COTTON · MONEY ·
BANK AND TRUST COMPANIES

PRICE FIVE DOLLARS

THE MANUAL OF STATISTICS COMPANY

20 VESEY STREET, NEW YORK

EPA7-001695–

the riparian lands, amounting to some 4,600 acres, belonging to the Hackensack Meadows Co. on the Hackensack and Passaic rivers, between Jersey City and Newark, N. J.

Stock.....Par $100.....Authorized, $3,000,000.....Issued, $3,000 000

FUNDED DEBT

1st and collateral trust mort., 5 per cent., due Oct., 1925, Apr. and Oct.....$1,850,000

The mortgage is for $3,000,000. Trustee, Standard Trust Co., New York. The bonds are subject to call at 102½ and interest.

There is also a mortgage upon the property of the Hackensack Meadows Co, for $1,211,000 at 4½ per cent., due 1921.

President, Walter G. Oakman, New York. Vice-President, Anson M. Bangs, New York. Secretary, Charles C. VanAnglen, New York. Treasurer, Frederick W. Walz, New York.

Directors—Anson M. Bangs, New York. William M. Barnum, New York. Pliny Fisk, New York. Andrew Freedman, New York. W. C. Kinney, Jersey City. William C. Lane, New York. Walter G. Oakman, New York. George R. Sheldon, New York.

Main office, 5 Nassau street, New York.

NEW JERSEY ZINC CO.

A corporation formed under the laws of New Jersey, October 30, 1880. The title was originally the New Jersey Zinc & Iron Co., which was changed to the present style in 1897. The business of the company is the manufacture of oxide of zinc and similar products. Its chief works are at Newark, N. J.

Stock.. ...Par $100.....Authorized, $10,000,000.....Issued, $10,000,000

Stock is transferred at the office of the company, New York.

Dividends at the rate of 16 per cent. per annum have been paid on the stock of the company.

FUNDED DEBT

1st mort., 4 per cent., due Oct., 1926, April and Oct..... $4,000,000

The authorised amount of the 1st mortgage is $10,000,000. Trustee, Farmers' Loan & Trust Co.. New York. Interest on the bonds is paid at the office of the company, New York.

President, Stephen S. Palmer. Vice-President, William P. Hardenburgh. Secretary, A. P. Cobb. Treasurer, H. S. Wardner.

Directors—Mark T. Cox. William P. Hardenbergh. August Heckscher. D. B. Jones. Stephen S. Palmer. M. Taylor Pyne. John L. Riker. Edwin M. Squier. Samuel Price Wetherill.

Main office, Newark, N. J. New York office, 71 Broadway.

NEW ORLEANS RAILWAY & LIGHT CO.

A corporation formed under the laws of Louisiana, June 12, 1905. The company is a reorganization of the New Orleans Railways Co. The latter company was formed under the laws of New Jersey, January 28, 1902, and acquired practically all the street railway and lighting facilities of New Orleans, the system having a total of 192.50 miles of track. It was a combination of the following companies, which are controlled through ownership of their stocks:

New Orleans City Railroad Co.
New Orleans & Carrollton Railroad, Light & Power Co.
New Orleans & Pontchartrain Railway Co.
Orleans Railroad Co.
St. Charles Street Railroad Co.
New Orleans Gas Light Co.
New Orleans Lighting Co.

Details as to the reorganization are given in the MANUAL for 1907.

Stock..Par $100...Authorized { com., $20,000,000 / pref., 10,000,000 } Issued { com., $20,000,000 / pref., 10,000,000 } $30,000,000

The preferred stock is 5 per cent., non-cumulative. Transfer Agents, New York Trust Co., New York; Whitney-Central National Bank, New Orleans. Registrars, Morton Trust Co., New York; Hibernia Bank & Trust Co., New Orleans.

The first dividend on the new preferred stock was 1¼ per cent. quarterly, paid January 15, 1906, and similar payments continued to be made, the dividend periods being January, April, July and October. The October, 1907, dividend, however, was reduced to 62½ cents per share, or ⅝ of 1 per cent., and the January, 1908, dividend was passed.

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DOCUMENT INFO

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Filename: 1909-06-07 Allen Co Commissioners Order.pdf

DOCUMENT INFO

TITLE DOCUMENT 16

GRANTOR:	Allen County Commissioners
GRANTEE:	Prime Western Spelter Company
INSTRUMENT:	Order
DATE:	06/07/1909
BOOK:	21
PAGE:	570
PARCELS:	1, 3

Kansas Natural Gas Company,
By J.C.McDowell, General Manager.

State of Kansas, County of Allen, ss

Be It Remembered, that on this 7 day of May A.D.1909, that before me the undersigned, a Justice of the Peace in and for county and state aforesaid, came Lydia Sniff and Myrtle Cation, nee Sniff, Nellie Chapman, nee Sniff and J.H.Chapman her husband, who is personally known to me to be the same persons who executed the within instrument of writing, and such persons duly acknowledged the execution of the same.

In Testimony Whereof, I have hereunto set my hand and affixed my seal the day and year last abovew written.

W.C.Alford, Justice of the Peace for said County.

State of Kansas, County of Allen, ss

Be IT Remembered, That on xxxx this 7" day of May A.D 1909, before me the undersigned a Justice of the Peace, Public, in and for county and state aforesaid, came E.R.Sniff and Ida Sniff his wife, who is personally known to me to be the same persons who executed the with in instrument of writing and such persons duly acknowledged the execution of the same.

In Testimony Whereof, I have hereunto set my hand and affixed my seal the day and year above written.

W.C.Alford.
Justice of the Peace in and for said County.

State of California, County of Kings, ss

Be It Remembered, That on this 12th day of May A.D.1909, before me the undersigned a Notary Public, in and for the county and state aforesaid, came Fred Cation who is personally known to me to be the same person who executed the within instrument of writing and such person duly acknowledged the execution of the same.

In Testimony Whereof, I have hereunto set my hand and affixed my official seal, the day and year above written.

SEAL C.Russell, Notary Public.

My commission expires Dec.28,1910.

State of Colorado, County of Arapahoe, ss

Be It Remembered, That on this 31 day of May A.D.1909, before me the undersigned, a Notary Public, in and for the county and state aforesaid, came Alonzo M.Sniff, divorced, who is personally known to me to be the same person who executed the within instrument of writing, and and such person duly acknowledged the execution of the same.

In Testimony Whereof, I have hereunto set my hand and affixed my seal the day and year above written.

SEAL Gideon L.Burton, Notary Public.

My commission expires Dec.17th 1910.

State of Colorado, County of Arapahoe, ss

Be It Remembered, That on this 5 day of June A.D.1909 before me the undersigned, a Notary Public, in and for the county and state aforesaid, came Grace Sniff and William Sniff, who is personally known to me to be the same persons who executed the within instrument of writing and such person duly acknowledged the execution of the same.

In Testimony Whereof, I have hereunto set my hand and affixed my seal, the day and year above written.

SEAL Gideon L.Burton, Notary Public.

My commission expires Dec.17th 1910.

State of Kansas, Montgomery County, ss

Be It Remembered, That on this 14th day of June, 1909, before me, the undersigned, a Notary Public within and for said county and state, came J.C.McDowell, General Manager of The Kansas Natural Gas Company, to me personally known to be the same person who executed the above and foregoing instrument and to me duly acknowledged the execution of the same in the manner and form therein set forth as the act and deed of such corporation.

Witness my hand and notarial seal, the day and year last above written.

William Inge. Notary Public. SEAL

My commission expires June 8,1913.

Filed June 15,1909 at 8 A.M. R.L.Thompson, Register of Deeds.

Commissioners Order.

Before the Board of County Commissioners of Allen County, Kansas.

In the matter of a Petition of Prime Western Spelter Company, a Corporation, for the Exclusion of its Smelter Site from the Boundaries of the City of Gas.

O R D E R .

And now on the 7th day of June 1909, at 1 o'clock P.M., appeared Prime Western Spelter Company, a corporation, by C.A.H.deSaulles, its assistant general manager, and Baxter D.McClain its attorney, before the Board of County Commissioners of Allen County, Kansas, sitting in the regular June session 1909 of said board, and then and there duly requested that the petition of said Prime Western Spelter Company praying for an order of said board excluding certain property belonging to said company from the incorporated limits of the City of Gas Allen County, KanSas, (as more particularly described in said petition) filed in the office of the County Clerk on the 10th day of April, 1909, and notices of the hearing of which having been duly given as required by law, and proof thereof duly filed in said County Clerks officembe now considered and acted upon by said board; and it further appearing that no remonstrations or objections had been made, either orally or in writing, and that there were no persons present before said board remonstrating or objecting to said petition, the board thereupon took the same consideration and adjourned further action upon the same until the 9th day of June 1909, at 1 o'clock P.M. All parties present being duly advised of such continuance and adjournment of the further consideration of said petition.

And now on the 9th day of June, 1909 at 10'clock, P.M., the said petitioner pres- EPA7-001698
ter D.McClain, its attorney, and there being no other persons remonstrating or objecting to

the same, the board of county commissioners continued the further hearing of said petition until the 15th day of June, 1909 at 2:00 o'clock, P.M., for the reason that the chairman of said board was unable to be present. All parties being duly advised of such continuance and adjournment of said petition.

And now on the 15th day of June, 1909, at 2:00 o'clock, P.M., the aforesaid petition of the said Prime Western Spelter Company coming on for further and final consideration of said board of county commissioners and the said board being fully advised in the premises, and there being no remonstrations or objections to said petition, either orally or in writing, and each and all of the members of said board of county commissioners being duly satisfied; that the said petitioner, Prime Western Spelter Company, is the owner of the lands sought to be excluded as hereinafter described; that said lands are unplatted; that said petition presented is in due and legal form and that due and legal notice of the time and place of hearing of the same of the said petition has been given as required by law; that no private rights will be injured or endangered by the granting of the said petition and the excluding of the lands therein described from the said city of Gas; that the public will suffer no loss or inconvenience thereby; that the prayer of the said petitioner should and ought to be granted; therefore,

It is hereby ordered and directed by the board of county commissioners of Allen County, Kansas, that the prayer of the petition of the Prime Western Spelter Company, a corporation, filed in the office of the County Clerk of Allen County, Kansas, as aforesaid, be and the same is hereby granted and that the lands of the said petitioner, to wit:

(a) The South Half ($\frac{1}{2}$) of the South-west Quarter ($\frac{1}{4}$) of the North-east Quarter ($\frac{1}{4}$) of Section No. Thirty-two (32), Township No. Twenty-four (24) Range No. Nineteen (19) known as the Prime Western Spelter Company, Works No. 1; and

(b) A tract of land located in the North-half ($\frac{1}{2}$) of the South-east quarter ($\frac{1}{4}$) of said Section No. Thirty two (32) described as follows, Beginning at a point Eleven Hundred and Five (1105) feet west of the North east corner of the southeast quarter ($\frac{1}{4}$) of said section No. Thirty-two (32) Township No. Twenty-four (24) Range No. Nineteen (19) thence running west thirteen and one half ($13\frac{1}{2}$) chains, thence south ten and thirty eight one-hundredths (10.38) chains, thence east Thirteen and one-half ($13\frac{1}{2}$) chains, thence North Ten and thirty-eight one hundredths (10.38) chains to the point of beginning, known as Prime Western Spelter Company Works No. 2.

be, and the same are hereby excluded from the boundaries of the City of Gas, Allen County, Kansas, And that said lands so excluded be now listed and hereafter listed and scheduled as though it had never been a part of said city and that the boundaries of said city shall remain the same as they existed at and immediately prior to the making of this order of exclusion save and except in the following particulars, to wit:

That the western boundary line of said City of Gas running south along the center of said section No. Thirty-two (32) terminate where the same intersects with the north-west corner of the South half ($\frac{1}{2}$) of the South-west Quarter ($\frac{1}{4}$) of the North-east Quarter ($\frac{1}{4}$) Section Thirty-two (32), and thence run east along said north line of the said south half ($\frac{1}{2}$) to the north-east corner of said south half ($\frac{1}{2}$), thence south along the east line of said South half ($\frac{1}{2}$) to the south-east corner of said South half ($\frac{1}{2}$), thence east to a point Eleven Hundred and five (1105) feet west of the north-east corner of the south-east quarter ($\frac{1}{4}$) of said Section Thirty-two (32), thence south Ten and thirty-eight (10.38) hundredths chains, thence west thirteen and one-half ($13\frac{1}{2}$) chains, thence North Ten and thirty-eight hundredths (10.38) chains, thence west to the said central line of said section thirty twp (32), and where the same now intersects with the heretofore west boundary of the city of Gas, and thence said boundary shall run south along said central line of said Section Thirty two (32) and continues and remain as the same existed prior to this order; provided however, that such change in boundary and the exclusion of the above described tracts shall in no way affect and this order is made subject to the right of way and property rights, as the same now exists, of the Fort Scott, Wichita & Western Railway Company (the Missouri Pacific Railway Company), as well as the jurisdiction and authority of the said, the City of Gas, over the same as such now exists; and further provided, that the said petitioner Prime Western Spelter Company consents and it is made a part of this order that the said the City of Gas, shall have permission to maintain a thorough fare, not exceeding thrity (30) feet in width, from the Southern extention of either main street, McRae Street or Taylor Street in said City, over and across the tract hereinbefore designated as Prime Western spelter Works No. 1, in a direct line from either of the aforesaid streets, which the said City may decide the most desirable to the station building located on the right-of-way of the Missouri Pacific Railway Company, but such privilege shall be at the expense of said City as to the maintonence thereof, and if the same be fenced, it shall be at the expense of said city and proper communicating gates shall be established on either side thereof and opposite each other at such point as the said Smelter Company, its successors or assigns, may designate.

It is further provided and made a part of this order that nothing herein shall be construed as in any way relieving the said, the Prime Western Spelter Company, a corporation, its successors or assigns, from its proportionate share and liability for future taxes on the premises herein excluded necessary for the payment of the water works bonds heretofore voted and issued by said City, together with the interest due, and becoming due thereon, or other bonds now existing and issued by said city, or other indebtedness of any kind for its proportionate payment of which the said company was, at the time of the granting of this order, liable but said company shall now and hereafter not be liable for the current taxes of said city, as levied from year to year, nor any other indebtedness of said city, as the same from time to time might accrue, or any claim or obligation of said city, or any proportionate part of the same, or either thereof, except as to the bond issue and kindred indebtedness above referred to, if any other there be; and the taxes annually levied by said City shall conform to the provisions hereof; and the County Clerk of Allen County, Kansas, is hereby ordered and directed in making up and preparing the tax rolls for the city of Gas, Allen County, Kansas, and particularly extending the same as to the properties in this order described, to extend and carry no levy of taxes against said tract of land for city purposes, except as provided in this order, but that said tracts of land for general taxing purposes and the various levies that go to make up the same, shall be listed, valued, assessed and taxed in Elm Township, Allen County, Kansas, and the School District in which the same is located and the said Clerk shall extend the same upon the tax rolls of said Allen County, Kansas, in conformity with this order for the year 1909 and thereafter, provided that when the said bonded

and kindred indebtedness of said City of Gas is fully paid, said lands shall be entirely dropped from the tax rolls and assessments of said City.

And it is further ordered that this order be entered at length on the record of the proceedings of this board, and that the County Clerk certify copy of the same to the Register of Deeds of Allen County, Kansas, and likewise certify copy to the Mayor and Council of the said, The City of Gas, Allen County, Kansas.

In Witness Whereof, the said board of County Commissioners of Allen County, Kansas, have hereunto subscribed their names, this 15th day of June A.D. 1909.

(Signed) G.W.Reynolds.
(seal) G.A.McAdams.
C.A.Fronk.
County Commissioners.

Attest;
R.E.Culbertson, County Clerk.

State of Kansas,) Certificate.
County of Allen,) ss

I, the undersigned, County Clerk of Allen County, State of Kansas, do hereby certify upon my honor as such Clerk and under the seal of my office, that the aforegoing is a full, true and correct copy of the original order made and filed in my office in the above entitled matter, and as the same appears upon the records in my office.

In TEstimony Whereof, I have hereunto subscribed my name as such County Clerk and affixed hereunto the seal of said office this 15th day of June A.D. 1909.

R.E. Culbertson, County Clerk.

Filed June 16, 1909 at 2 P.M. R.L. Thompson, Register of Deeds.

Bill of Sale.

Know All Men By These Presents, that I have this day sold to Lutie Barrackman all the growing crops of every kind that I now have in Allen Co., Kansas, This bill of sale is given to secure the said Lutie Barrackman on a certain promisory note of 420 Dls. given Apr. 1st, 1909.

June 16, 1909,

J. Barrackman.

Filed June, 16, 1909 at 3 P.M. R.L. Thompson, Register of Deeds.

Right of Way.

In consideration of one (1.00) Dollars, ($1.00) the receipt of which is hereby acknowledged, The Monarch Portland Cement Company, incorporated under the laws of the State of Kansas, of Humboldt, Kansas, do hereby grant unto the Humboldt Gas Company, incorporated under the laws of Kansas, Humboldt, Kansas, its successors and assigns, the right to lay, maintain operate and remove pipe to be used for the transportation of gas over its land in Allen County, State of Kansas, being south [illegible] quarter of Section (10, Township 26, Range 18, 35 acres more or less, as shown by "Exhibit A" attached hereto, which is a part of this contract. The lands described are what are known as the Cement Site; with ingress and egress to and from the same. The said Grantor to fully use and enjoy said premises except for the purposes hereby granted.

Said lines of pipe shall be laid upon a strip of land not to exceed eight feet in width through the property, Commencing at south line of "Graebfield" lands, thence north west to a point on the north line of the "gardner" land.., being 1250 feet more or less, and shall at the request of the grantorx be buried so as not to interfere with the cultivation of the soil or the laying of pipes by the grantee. The sum above named is in payment full for the right above granted and for the damage which will be done to drops, fences, and soil in laying, maintaining and operating the first of said lines which may be laid. Damages which may be done to crops and fences hereafter by laying, maintaining and operating any line, other that the first one laid or by removing any line shall be paid by the grantee, and and in case of disagreement as to the amount thereof, the same shall be determined by three disinterested persons, one of whom shall be chosen by the grantor, another by the grantee and a third by the two thus chosen.

Witness our hands and seals this 16th day of June A.D., 1909.

The Monarch Portland Cement Co.,
By O.W. Connet, President.
William Keith, Secretary.

The Humboldt Gas Co.,
By O.A. Evans, Prest.
W.P. Pussman, Secy.

State of Kansas, County of Allen,

Be It Remembered, That on this 16th day of June A.D. 1909, before me, a Notary Public, in and for said County, and State, came O.W. Connet, President of The Monarch Portland Cement Company and William Keith, Secretary of The Monarch Portland Cement Company, to me personally known to be the same persons described in, and who executed the foregoing instrument, and duly acknowledged the execution of the same.

In Witness Whereof, I have hereunto set my hand and affixed my official seal, the day and year last above written.

Hazel Gardner, Notary Public.

My commission expires July 3, 1912.

(For map of above described land see Next page.)

DOCUMENT INFO

EDFolder: D:\Question 08\NJZ Published Sources\

Filename: 1911-01-12 Collinsville Get Smelter article.pdf

DOCUMENT INFO

THE COLLINSVILLE NEWS.

VOL. 12 | COLLINSVILLE, OKLA., JAN. 12 1911. | NO. 35

$1.00 Per Year. | PROTECT THE TOILER and PRODUCER. | Clubbing Rates Made

$ $ $ $ $

OVER FIVE MILLION
-: IN 1910 :-

We Sold Bank Drafts to the Amount of	$505,586.00
We Received Deposits to Amount of	$2,109,848.00
We Cashed Checks to the Amount of	$2,782,874.00
TOTAL	$5,398,308.00

We furnish these figures simply to give you an idea of the enormous amount of business handled over our counter during the year just past, and we are going to do even better this year. We are trying to give our customers the very best there is in banking. We have tried to make the words, "FARMERS & MERCHANTS BANK" synonymous with the words "Safety, Uprightness and Courtesy" We have tried to make our institution something more than a money-making machine and while we have hewed close to the line in regard to what we consider safe banking, we have tried so far as it was in our power, to help every one with whom we, as an institution, came in contact. If you are not already a depositor, open an account today, and enjoy the superior facilities offered to you through your association with the

FARMERS & MERCHANTS BANK

Your Deposits are Guaranteed.

$ $ $ $ $

COLLINSVILLE GET SMELTER

Tulsa World Reports one Landed Here.

Special to the World

Collinsville, Okla., Jan 11 — The thing which has been puzzling the people of Collinsville for some time past what means the action of the Santa Fe officials and the party of surveyors working just south of here was learned today when definite information was gained concerning the removal to this place of the Prime Western Smelting Company of Iola, Kansas

It is understood that definite consummation of the deal was made in Tulsa yesterday between Santa Fe men and C A DeSalle of the smelting company

From what can be learned, the Prime Western company will establish a five block zinc smelter just south of Collinsville, between here and Owasso The grounds are already laid off and surveyed, and it is presumed that the smelting company is here establishing a small town around the plant, which, it is understood, will cost in the neighborhood of $100,000

One of the chief reasons for the removal of the Prime West are coming from Iola to this place is the question of gas here and the only coal will be in producing it The plant when fully equipped, em ploys 250 men

It is understood that the smelting company has considered propositions made by Tulsans and Tulsa's Commercial organization but they could not overcome the treasure which the company holds in the way of gas

Collinsville is located on the Santa Fe about 18 miles north and east of Tulsa Local men have admitted the attempt to land the smelting company with in the past several weeks It is safe to say, however, that much local benefit will be derived by reason of the locating of the concern so near to Tulsa

The location of the company at Collinsville, it is understood, did not involve the question of a bonus, the smelting company choosing that place only because of its ownership of surrounding gas lands

Hon. Edward Howard is the name of a new law firm in Claremoral Judge Bonds will be remembered by all, as the first and very efficient and accommodating Judge of the county court of Rogers county.

News failed to report the accident of the home of Hal Henson being burned on New Years eve and Mr. Henson was badly burn about the head It was very unfortunate, as they were literally cleaned out of house and home

Miss Preston died at the home of R. Urquhan Wednesday night and was buried in the Adkins cemetery Thursday.

GUARANTEE ACT IS HELD GOOD

Oklahoma, Nebraska And Kansas Measures Are Constitutional

Washington, Jan 8.—The bank guaranty laws of Oklahoma, Nebraska and Kansas were declared constitutional today by the supreme court of the United States, and thus the fight over the policy of guaranteeing, through the state, of deposits in banks, was won by the advocates of such a policy.

The opinions of the court were announced by Justice Holmes He said the main objection to the laws was that the assessment of banks by the state in order to create a fund to guarantee the deposits in other banks within the state took private property of one bank for the private use of another without compensation.

Justice Holmes admitted that there might be a taking of private property without return to pay debts to a rival in business, but he said there were powerful considerations on the other side of the question.

"In the first place," he said, "it is established by cases that an overwhelming public advantage may justify a comparatively insignificant taking of private property for which in the immediate purpose, is a private use.

"It would seem that there may be other cases besides the every-day one of taxation, in which the share of each party in the benefit of a scheme of mutual protection is sufficient compensation for the co-relative burden that it is compelled to assume At least if we have a case within the reasonable exercise of the police power as above explained, no more need be said"

The justice then proceeded to justify the laws under the police powers. The police powers, he said may be put forth in aid of what is sanctioned by usage, or held by the prevailing morality or strong and preponderant opinion to be greatly and immediately necessary to the public welfare

The laws came within this limit, he held

The news that the supreme court of the United States had affirmed the Oklahoma supreme court in upholding the constitutionality of depositors bank guaranty law was received with considerable interest here yesterday. Within fifteen minutes after M. L Turner, of the Western National Bank, had received a telegram announcing the decision, it was a subject of vast discussion in political and banking circles of the city

The case decided was that of the Noble State bank of Noble versus Governor C. N. Haskell, et al, the other defendants being the other members of the state banking board and the bank commissioner. It was a case originated in January, 1908, to test the depositor's guaranty plan generally, and though begun in the name of the Noble State Bank, was backed by contributions from many leading bankers of Oklahoma who were then unfriendly to the bank guaranty law The best legal talent was engaged on both sides and C B. Ames, of this city, was special counsel for the state in defending the guaranty law He made his final arguments at Washington only a few days ago

The fundamental principle involved in the case was the question Whether one bank could be compelled to contribute to a general fund to protect the depositors of all state banks generally The attorneys for the Noble state bank contended that in requiring this the law was an infringement of a leading principle of the United States constitution The case was filed before Wesley Judge A G Huston, at Guthrie He was asked to grant a perpetual injunction restraining the state banking board and bank commissioner from collecting or levying an assessment for the guaranty fund, and from forfeiting the charter of the Noble bank for refusing to pay the same Judge Huston upheld the guaranty law and refused the injunction The case was appealed to the supreme court of the state and the guaranty law was again Justice Robert J. Williams, then chief justice, in a masterly opinion, on June 16th, sustained law and upheld District Judge Huston in his refusal to grant the injunction The opponents of the guaranty law then appealed to the supreme court of the United States, where they have has again and finally - New state Tribune

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DOCUMENT INFO

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Filename: 1912-10-22 US Patent 1041977 De Saulles NJZ.pdf

DOCUMENT INFO

C. A. H. DE SAULLES.

ZINC RETORT FURNACE.

APPLICATION FILED APR. 22, 1911.

1,041,977. Patented Oct. 22, 1912.

Fig. 2.

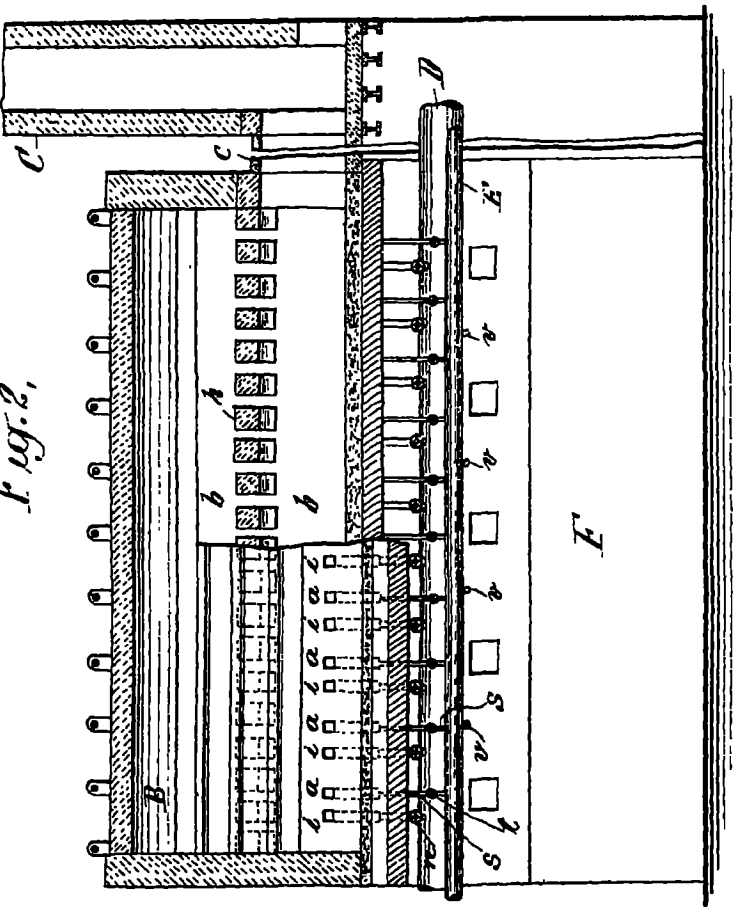
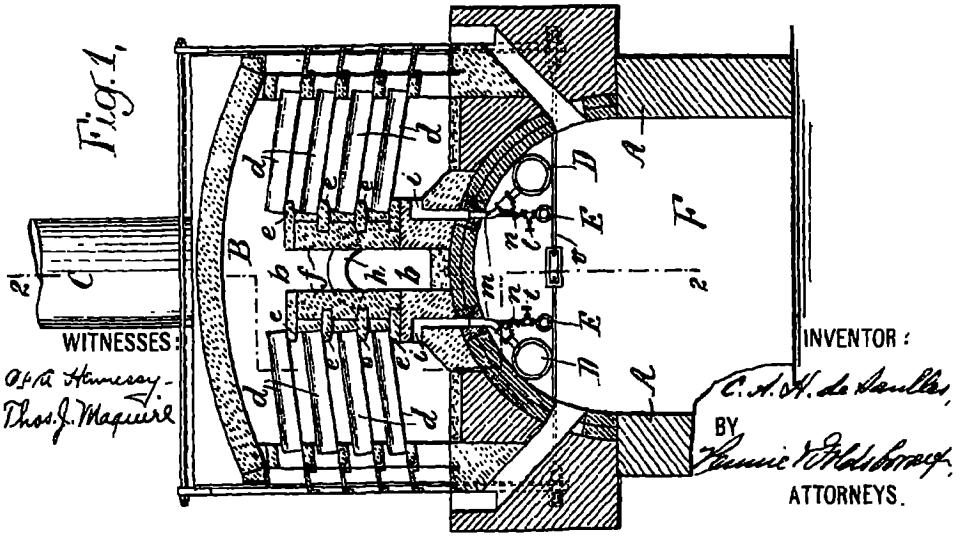


Fig. 1.



WITNESSES:

A. H. Hennessy.

Thos. J. Maguire

INVENTOR:

C. A. H. de Saulles,

BY

Dennis & Goldsborough

ATTORNEYS.

EPA7-001702

UNITED STATES PATENT OFFICE.

CHARLES A. H. DE SAULLES, OF GAS, KANSAS, ASSIGNOR TO NEW JERSEY ZINC COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

ZINC RETORT-FURNACE.

1,041,977. Specification of Letters Patent. Patented Oct. 22, 1912.

Application filed April 22, 1911. Serial No. 622,671.

To all whom it may concern:

Be it known that I, CHARLES A. H. DE SAULLES, a citizen of the United States, residing in Gas, county of Allen, State of Kansas, have invented certain new and useful Improvements in Zinc Retort-Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to zinc retort furnaces of that type wherein the exit flue for the products of combustion is located at one end of the furnace chamber, the retorts or muffles being supported, as usual, in an inclined position, in a number of rows one above the other, and being heated from below by the combustion of gaseous fuel admitted through a series of gas ports associated with a corresponding series of air supply ports.

In the furnace hereinafter described, the arrangement of the retorts or muffles is duplex, in the sense that the combustion chamber is practically divided into two compartments merging at the top in a central down-take, whose walls serve to support the shelves or ledges upon which rest the rear ends of the retorts. Each of these compartments is heated in the same way, that is to say, from gas and air ports disposed alternately in longitudinal series along the base of the ledge-supporting wall.

In a symmetrical arrangement of duplicate compartments of this character, whose products of combustion are conducted through a down-take common to both, to an exit flue located at the extreme end of the furnace, the draft of the chimney upon the gas and air ports varies progressively from one end of each compartment to the other, and to such a degree that there is a corresponding non-uniformity of temperature conditions in the combustion chamber, the portions more remote from the exit end for the waste gases being less efficiently heated. As a consequence, in order that the charges in the retorts may be finished or worked off within practically the same working time, some sacrifice in the amount of the charge must ordinarily be tolerated in the less efficiently heated retorts.

My invention is designed to avoid this difficulty, so as to permit the retorts, whatever be their location with respect to the exit-flue of the combustion chamber, to be equally heated, and therefore to be worked off, with the maximum charge for each, in practically the same time, thereby proportionately increasing the output of the furnace as a whole. To this end, I supply both the air and the gas to the furnace, under pressure, from suitable mains and provide the branch pipes, leading from the respective mains to the air and gas ports of the combustion chamber, with independent regulating valves. By appropriately adjusting these independent valves, according to the pressures prevailing in the mains and according to the draft of the chimney, I am thus enabled to realize with substantial accuracy equalized conditions of temperature throughout the entire length of both compartments of the combustion chamber,—a result which, so far as I am aware has not been heretofore accomplished in furnaces of this type.

In the accompanying drawing Figure 1 represents a cross-sectional view, partly in elevation, and partly broken away, of a zinc retort furnace embodying my improvements; Fig. 2 represents a longitudinal sectional view thereof taken in part on a central plane, and, in part, on a plane indicated by the irregular dotted line 2—2 of Fig. 1.

Similar letters of reference indicate similar parts throughout the several views.

Referring to the drawing, A indicates the supporting foundation for the retort chamber B, which, as shown, is divided into two compartments having a central longitudinal downtake *b*, which communicates at one end of the furnace with a suitable flue *c* leading to the chimney stack C. The retorts *d* for receiving the charge of zinc ore and reducing material are supported in the usual manner in an inclined position, and rest with their rear ends upon the ledges *e* which are supported by the vertical walls *f* of the downtake *b*, said walls being suitably buttressed by the arches *h*.

At the base of each of the compartments of the combustion chamber are located a series of air ports and a series of gas ports, which are preferably assembled in pairs and alternating with each other, the pairs being preferably spaced at substantially equal distances apart, so as to control the temperatures prevailing in the respective

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zones of the furnace to which they severally belong. The air ports *i* communicate with an air pressure main D, through the instrumentality of a series of branch pipes *m*, each of which is provided with a regulating valve *n* for controlling the supply of air therethrough. So also, the gas ports *a* are connected to a gas pressure main E through the instrumentality of a series of branch pipes *s*, each of which is provided with a regulating valve *t* for controlling the amount of gas passed therethrough. The air pressure main D and the gas pressure main E for each compartment of the combustion chamber are conveniently located in the arched tunnel F and may be supported, as shown, upon the tie rods *v*, or otherwise.

The mode of operation of the furnace will be apparent.

By means of the regulating valves for the air and gas ports, the relative quantities of air and gas to obtain an equalized combustion throughout the length of both compartments of the combustion chamber may be accurately determined by the skilled operator, or may be varied from time to time as circumstances may require.

Having thus described my invention, what I claim is:—

1. A zinc retort furnace, provided with a combustion chamber having an exit flue for the products of combustion at one end thereof, zinc retorts located within the chamber, a series of air ports and a series of gas ports opening into the combustion chamber below the retorts, an air pressure main and a gas pressure main communicating with the said air and gas ports respectively, and valves for controlling independently the air supply and the gas supply from the mains to each of the air and gas ports; substantially as described.

2. A zinc retort furnace, provided with a combustion chamber having two compartments with a central downtake, an exit flue for the products of combustion communicating with the downtake at one end of the chamber, zinc retorts located in the compartments, a series of air ports and a series of gas ports opening into each compartment below the zinc retorts, an air pressure main and a gas pressure main communicating with the air ports and gas ports respectively, and valves for controlling independently the air supply and the gas supply from the mains to each of the air and gas ports; substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

CHARLES A. H. DE SAULLES.

Witnesses:
A. D. TERRELL,
BLANCHE GOES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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DOCUMENT INFO

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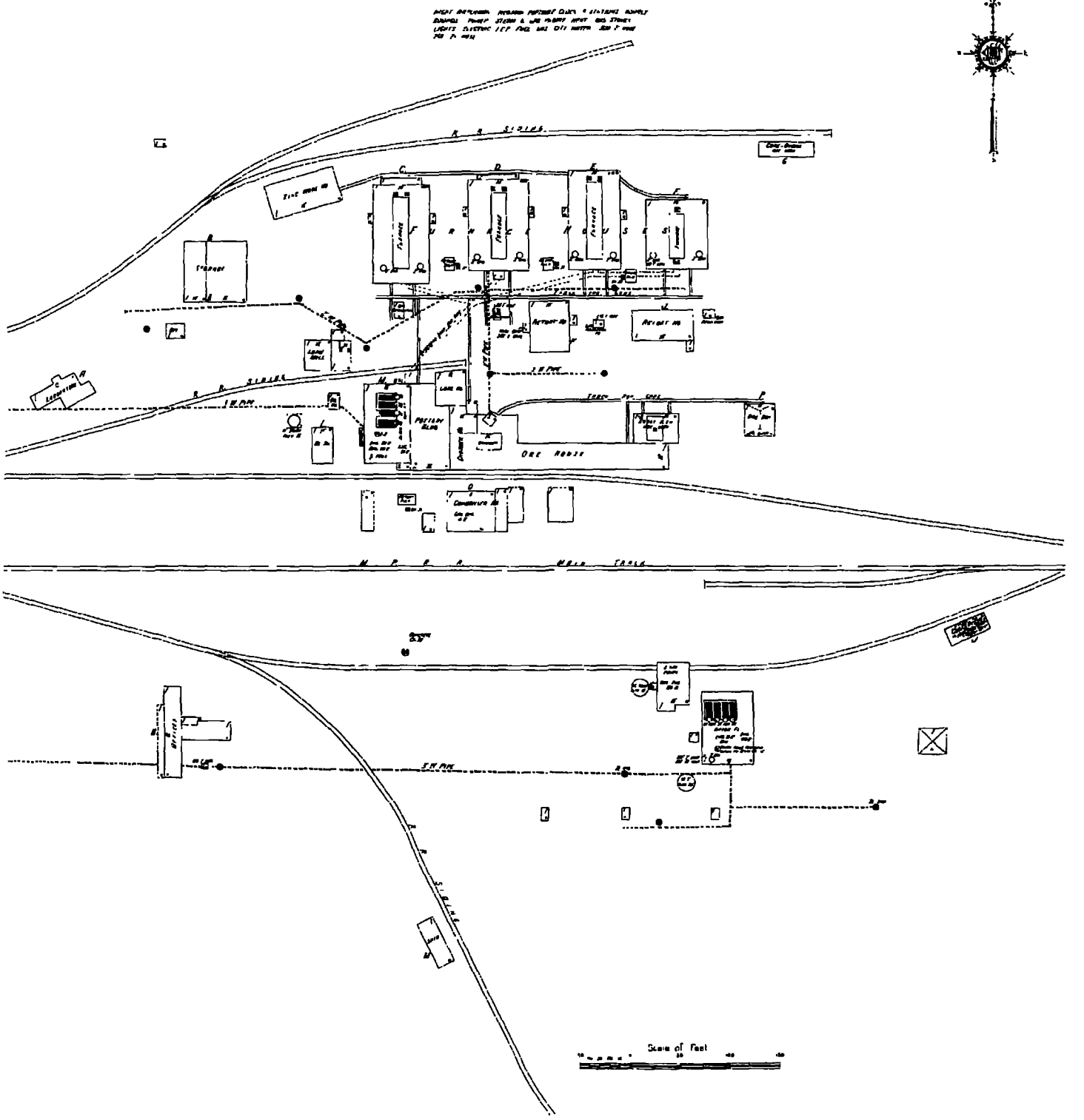
Filename: 1916-05 Gas Sheet 7.pdf

DOCUMENT INFO

7

MAY 916
GAS
KAS

PRIME WESTERN SPELTER CO., SMELTER WORKS Nº 1



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DOCUMENT INFO

EDFolder: D:\Question 08\NJZ Published Sources\

Filename: 1918-02-28 Tornado hits Smelters article.pdf

DOCUMENT INFO

THE IOLA DAILY REG

VOLUME XXI. NO. 108. The Daily Register, Established 1897. The Weekly Register, Established 1867. IOLA, KAS., FEB. 28, 1918—THURSDAY EVENING. Successor to Iola Daily

WORST STORM IN HISTORY VISITS THIS SECTION—$100,000 IN PROPERTY LOSS

PRESBYTERIAN CHURCH IN IOLA IS PILED IN HEAP.

TWO SMELTERS ARE IN RUINS

PRIME WESTERN FURNACES AT IOLA AND GAS BURN DOWN.

Many Buildings in County Damaged—Telephone Lines Down and Communication Is Cut Off.

As the result of a cyclone and terrific windstorm, the worst that ever visited this section of the country the Prime Western Smelter furnaces at Plants No. 3 at Iola and No. 1 at Gas are in ruins, the Presbyterian church and Iola Electric power plant and car barns are wrecked. Hundreds of barns, farm houses, telephone lines and outbuildings were blown down but conditions to operate in two or three days. The trolley lines and poles are down between Iola and Gas and it will be several days before they can be put up again.

Gas City Scene of Wreckage.

At Prime Western plant No. 1 at Gas the five furnace blocks were lost by fire which followed when the buildings were uprooted by the force of the wind. The five blocks were down in a mass of ruin today. The estimated loss is $6,000. The store front of the Shannon Hardware Company, and the Gas postoffice were blown out. Three small brick buildings were wrecked also.

The Battarpe Pacific depot was torn to pieces and surrounding building were turned over. At Moran and vicinity livestock was killed and many barns and farmhouses were damaged according to fragmentary reports received in Iola today. Telephone communications were good to Moran, however.

Twisters Struck Humboldt.

Unfirmed reports from Humboldt received by this office this afternoon indicate that several twisters operated in the southern part of the county today. In consequence the foreign news is short today.

The roof of the main building at the Iola Brick Plant was torn off. Mr. Fegley lost his garage in Wheeler Heights and his Saxon car was damaged slightly.

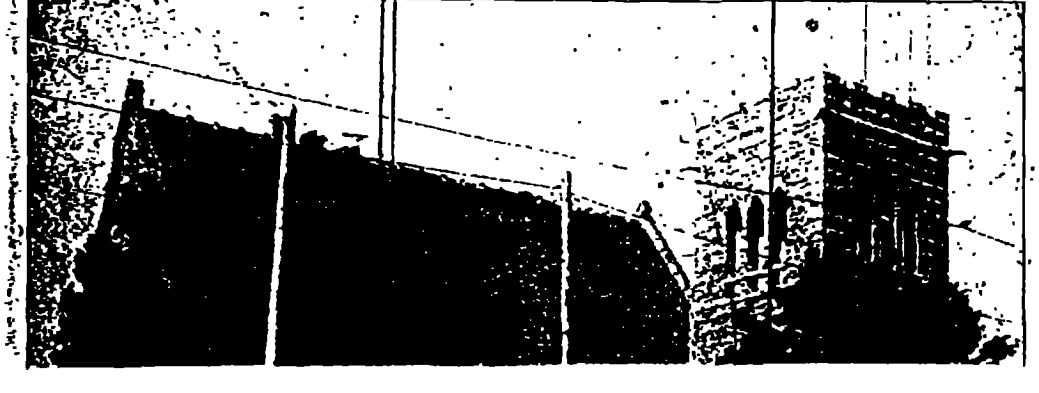
The Iola fire truck was called to the smelters shortly after nine o'clock last night. Several hundred feet of hose was connected with the city's water line but the fight with the flames was useless.

On the run east of the city last night Chief Creason lost a tire chain and a hub wrench from the truck. He would appreciate it if the party finding the lost articles would return them to the fire station. The wrench and chain were probably lost on East street.

Dr. Manley woke up this morning and found the barn on his lot turned over. Dr. Manley lives at 719 East Jackson street. His Dodge car was in the barn but was not damaged when the building turned turtle.

Andy Larson, a veteran fireman on block number 3 at the Gas City smelter, burned his feet before getting out of the furnace shed.

Alva Shadwick, who owns a farm southwest of the Fair Grounds, stands a good chance of losing some of his feed and grain. His grain and stock



DR. CRUMBINE SWATS TOWN PIG

STATE LAW DOES NOT FORBID TOWN HOG-RAISING.

HEALTH OFFICER OPPOSES IT

MENACE TO HEALTH OF PEOPLE OF THE NEIGHBORHOOD.

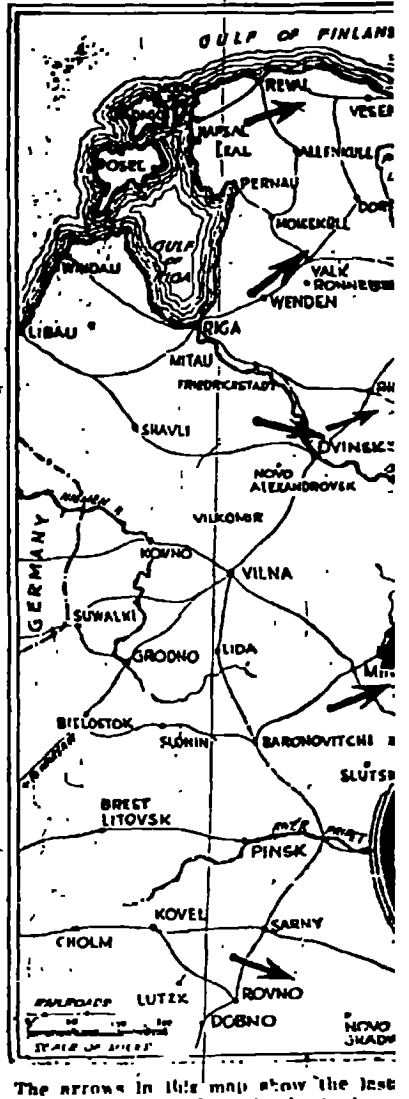
Iola Will Vote on the Question Soon and Parties on Both Sides are Interested.

According to Dr. J. S. Crumbine, secretary of the state board of health, town pigs are not a war measure but a menace to the health of the citizens of the neighborhood. The state health officer issued the statement yesterday and he strongly advised against the custom, which has been advocated by many boosters of conservation of food products.

The question will come up for vote by ballot in the next city election in Iola and public sentiment is very strong in favor of the measure. The city commissioners appealed to Dr. Crumbine, who informed them that there was no state law forbidding the practice. The Register has offered space for letters from the public on the questions and many have appeared offering argument for and against the measure. The statement of the health officer which will interest the parties on both sides, follows:

"The old question of hog pens within town limits is perennial, and from the letters of inquiry and protest against hog pens received lately, a few people seem inclined this year to use, 'on account of the war,' as a sort of camouflage or pretext for raising pigs in-

Germans Sweeping on



The arrows in this map show the last marching through Russia on to the capture born, who has been on the eastern front el leading a "best" along "Finla

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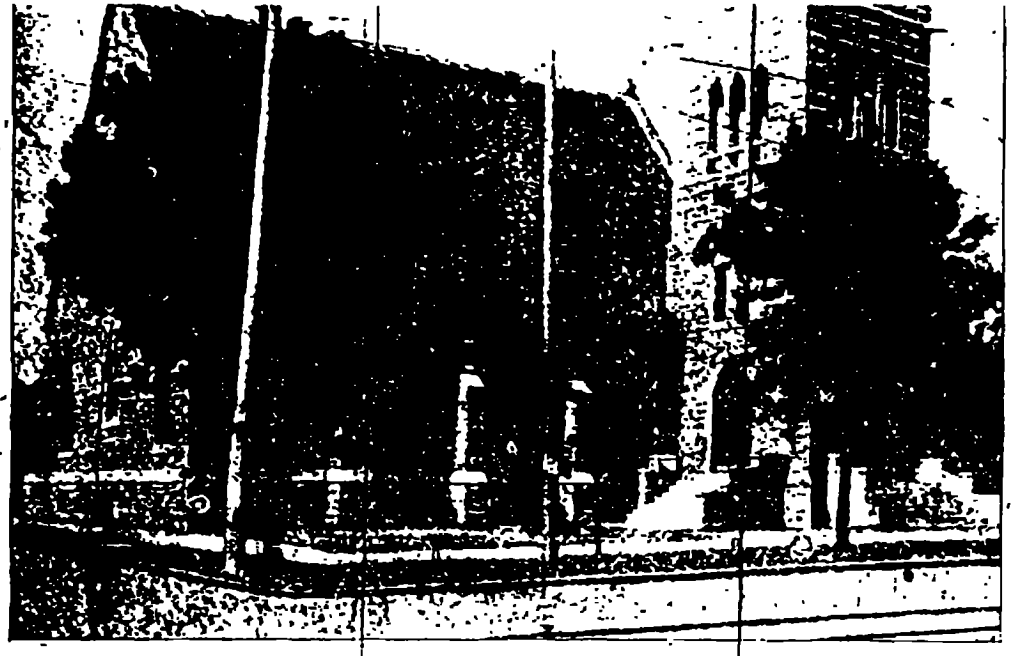


This is the beautiful Presbyterian church building, lodged and equipped in 1907 at an expense of more than $40,000. The roof and walls of the auditorium of the building are in ruins today. It is estimated that the damage done to the building will exceed $20,000. The edifice was one of the most beautiful in the state.

no injuries or loss of lives [illegible]

The cyclone struck Iola shortly after nine o'clock last night. It is estimated that the property loss in Allen County will exceed one hundred thousand dollars, nearly [illegible] reached Iola today that [illegible] towns were struck and much property was damaged and destroyed. The telephone connections between towns are down and all we can gather is from Associated Press reports from Kansas City because of the damages [illegible]

Church Damaged Worst.

The worst results from the storm caused the Iola Presbyterian church, built and equipped in 1907 at an expense of $40,000, to collapse. The roof and walls of the main auditorium are in a heap and the steeple and main entrances were torn down. Fences and housetops in the immediate vicinity were damaged.

The furnace shed at the Prairie Western plant No. 2, three quarters of a mile east of Iola, were blown down and immediately caught fire. Seven blocks were destroyed. Several tool sheds and kilns were lost in the yards also. The six-room buildings of [illegible] were turned over and the feed [illegible] of the weather

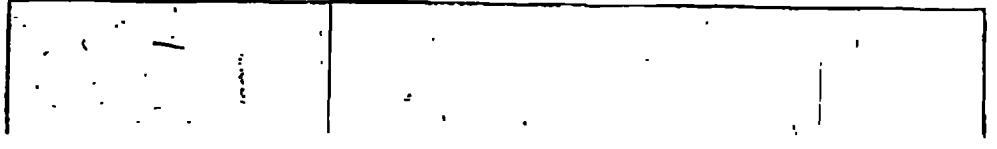
[illegible] at the Iola Electric power house tells the tune of the storm. The [illegible] stopped at twelve minutes after nine just as the fireman shut down the plant. The workmen at the plant have a danger signal arranged when a storm approaches the current is cut off and the machinery of the entire plant stops. The juice was cut off just as the car barn shook and this is the fireman probably saved the entire loss from fire which would have followed.

The Heaviest Losses.

Presbyterian church [illegible]
Iola Sanitary No. 2 [illegible]

Thomas Finnigan, manager of the Iola Electric Line is ready for an earthquake. This is the third time that the line has been out of commission. After a fire and flood the plant was rebuilt and Finnigan will soon be ready for business again. Tain't [illegible]

The loss suffered by the Iola Electric is placed at $7,000. The company has ten cars, which will operate



for questions and many have appeared offering arguments for and against the measure. The statement of the health officer which will interest the parties on both sides, follows:

"The old question of hog pens within town limits is perennial, and from the letters of inquiry and protest against hog pens received lately, a few people seem inclined this year to use, on account of the war, as a sort of camouflage or pretext for raising pigs instead of babies, and establishing hog pens instead of gardens.

"As a conservation measure the hog pen is all right, provided the town is more interested in the conservation of hogs than it is in the conservation of babies, in meat more than life.

"There is no state law to keep the people from having hog pens in the cities of Kansas if the people want them.

"There has been some advocacy within recent years by sanitarians of high standing of municipal piggeries—that is to say, for the use of the town's garbage in raising pigs in pastures or pens established some distance from the town limits. I am not aware of the advocacy of sanctioning hog pens in town or cities by health officers of any reputation whatsoever. As state health officer I do not hesitate to condemn such a proposition, both as a sanitary measure and as a war measure. It is true that the war has established a higher price for pork. It is equally true that the war, by bringing about the examination of millions of American men taken from the healthiest age period from the rank and file of industrial America, has brought to life an amount of physical imperfection that establishes with all clear thinking people a new value for health conditions far in excess of any additional value that the war has placed on pork.

"City authorities should weigh both sides of the question carefully before giving their sanction to the creation of insanitary conditions within the city limits."

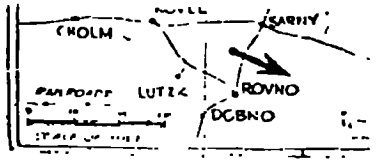
agents estimate that several hundred farms had been reported down.

Art Gibson, the wide-awake photographer, was on the job this morning and mounted pictures of the ruins at Uca and Iola displayed in his windows this afternoon are the result.

The following farmers residing southwest of town are among those reporting barns lost, strayed or destroyed by tornado today: Mrs. H. Green, Earl Hicks, Mr. Arthur, Mrs. I. Smith, Mr. Dawson, Walter Jones and Emile Rush. These farmers reside in a district ranging from three to four miles west and south of Iola.

Storm Path 150 Miles Wide.

Last night's storm wrought havoc in Kansas over the entire territory between Wichita and Moran. Passen-



The arrows in this map show the [illegible] marching through Russia, on to the Polish border, which they crossed at the point of the arrow. Another army is on its way to Petrograd. General Von Linsingen has joined forces with Austrian troops at Novo Grodek, and on the Fourth army has taken Minsk and gone [illegible]

FOUND THE NORTHRUP CAR

UNDERSHERIFF ON WAY TO LIBERAL, KAS., FOR THIEF.

Local Officers Received Wire That Car and Thief Are Held at the Kansas Town.

Undersheriff Ed P. Sutherland and Mr. Morris of the Morris Garage Co., 224 North Jefferson avenue left this morning for Liberal, Kansas to take charge of the Haynes 8 car and the thief held by the officers at Liberal. A wire was received late yesterday afternoon from the county attorney of Seward county, Kansas, stating that a car answering the description given in the circulars sent from here, would be held until officers arrived to identify the car.

The F. A. Northrup car was stolen in August, 1917. No trace has been found since. A warrant was made out for John Doe by the local officers as no name was given for the party held at Liberal.

A fifty dollar reward is offered for the return of the car and an additional fifty dollars will be given by the owner for the conviction of the thief. Circulars giving a description of the car were sent to every county in Kansas and the surrounding states.

The Northrup car was a 1917 model of the Haynes roadster and was equipped with wire wheels. On the night of August 12, 1917, a call came to the Morris Garage where the car was kept asking that the car be sent to the Santa Fe depot. One of the workmen drove the car to the station and returned to the garage. Nothing since has been heard of it. Undersheriff Sutherland will arrive in Liberal late tonight.

To make prohibition effective when it becomes operative in New Hampshire May 1, leading manufacturers and business men from all sections of the state have been summoned to a conference to be held at Concord today.

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no injuries or loss of life.

The cyclone struck Iola shortly after nine o clock last night. It is estimated that the property loss in Allen County will exceed one hundred thousand dollars easily. Reports have reached Iola today that the nearby towns were struck and much property was damaged and destroyed. The telephone connections between towns are down and it was impossible to get the Associated Press report from Kansas City because of the damaged lines.

Church Damaged Worst.

The force resulting from the windstorm caused the Iola Presbyterian church, built and equipped in 1904 at an expense of $40,000, to collapse. The roof and walls of the main auditorium are in a heap and the steeple and main entrances were torn down. Fires and housetops in the immediate vicinity were damaged.

The furnace sheds at the Prime-Western plant No 3, three-quarters of a mile east of Iola, were blown over and immediately caught fire. Seven blocks were destroyed. Several tool sheds and kilns were lost in the yards also. The mix-room buildings, offices

[illegible] at Humboldt which are vacant [illegible] were wrecked and two valuable hay barns are down today. The [illegible] furniture factory located on the [illegible] river at Humboldt used in recent years for storage purposes, was [illegible] and the force of the wind destroyed the Dickerson hay barn. The Dickerson [illegible] is near the Katy [illegible].

[illegible] cars on the Katy tracks were [illegible]. The refinery property suffered slight damages. The O'Connor [illegible] near the refinery was [illegible] down and the hay barn on Robert Works farm was lost with several head of stock killed. The front porches of the J. W. Damm and Fred Schmidt [illegible] on the Iola-Humboldt road were [illegible] down. Schmidt lost his big barn also. Mr. J. W. Damm told a reporter that the telephone poles and lines were down on the rock road leading into Iola also.

The Heaviest Losses.

Presbyterian church $20,000
Iola Smelters No. 3 ..... $6,000
Gas Smelters No. 1 ..... $6,000
L. E. R. R. car sheds $7,000

If the reports reaching Iola today are true at least one hundred barns in the county were blown down last night. As soon as the connections between the towns are established a full report of the damages will be given.

As the wires between Iola and Kansas City are down the Associated Press reports were not received in Iola [illegible] to the weather.

The clock at the Iola Electric power house tells the tune of the storm. The regulator stopped at twelve minutes after nine just as the fireman shut down the plant. The workmen at the house have a danger signal arranged. When a storm approaches the current is cut off and the machinery of the entire line stops. The "juice" was cut off just as the car barn shook and this act of the fireman probably saved further loss from fire which would have followed.

Louis Finnigan, manager of the Electric line is ready for an earthquake. This is the third time that the line has been out of commission. After a fire and flood the plant was rebuilt and Landrean will soon be ready for business again. Talk about Iola liveness.

The loss suffered by the Iola Electric is placed at $7,000. The company has two cars which will operate as soon as the lines can be put up again.

Manager Swift of the Bell Telephone company had sixteen operators on the job and they rendered heroic service in giving immediate connections. None of the local wires were down.

I. E. Powell announced this afternoon that thirty-six tornado claims had been filed with him up to three o'clock this afternoon. Insurance agents estimate that several hundred barns had been reported down.

Art Gibson, the wide-awake photographer, was on the job this morning and mounted pictures of the ruins at Cas and Iola displayed in his windows this afternoon are the result.

The following farmers residing southwest of town are among those reporting barns lost, strayed or destroyed by tornado today: Mrs. H. Green, Earl Hicks, Mr. Arthur, Mrs. I. Smith, Mr. Dawson, Walter Jones and Ernie Rush. These farmers reside in a district ranging from three to four miles west and south of Iola.

Storm Path 150 Miles Wide.

Last night's storm wrought havoc in Kansas over the entire territory between Wichita and Moran. Passengers coming from the west this afternoon describe one long series of wrecked buildings all the way. At Piqua several small buildings were destroyed or partially blown down. Yates Center sustained a loss of several thousand dollars. Four or five houses there were torn to pieces but through some great fortune no lives were lost. The rain which preceded the storm in Central Kansas measured more than an inch at Wichita and has soaked the ground pretty thoroughly giving new lease on life for the wheat.

C. E. BENTON DEAD.

Word has been received here of the death of C. E. Benton, former Iola attorney, which occurred in Los Angeles, Calif., Saturday, February 23. Mr. Benton was a law partner of A. H. Campbell of this city twenty years ago. After leaving this city he practiced at Ft. Scott. He was general attorney for the Missouri Pacific railway for many years with headquarters at that place.

Benton moved to California, where he retired from active practice several years ago. Mr. Benton and his wife were in Iola for a visit in December.

Besides his wife he is survived by three sons, who were in California at the time of his death. Dean Benton lives in Kansas City, Mo.

American men taken from the healthiest age period from the rank and file of industrial America, has brought to life an amount of physical imperfection that establishes with all clear thinking people a new value for health conditions far in excess of any additional value that the war has placed on pork.

"City authorities should weigh both sides of the question carefully before giving their sanction to the creation of insanitary conditions within the city limits."

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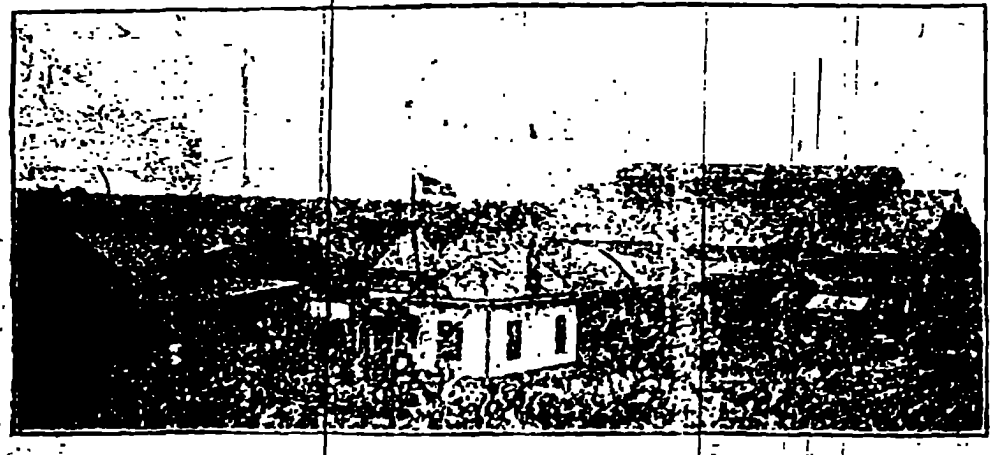
Altoona, Pa., celebrates the semi-centennial of the first organization of its city government.

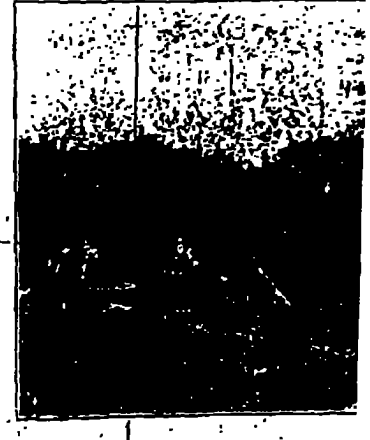


The Gas City plant of the Prime Western Spelter Company has operated for years and has always been regarded as one of the most reliable industrial plants in this section. The furnaces and sheds were ruined by the cyclone and fire which followed.

and warehouses were not affected.

Repairing Electric Power House.

The damage at the Iola Electric Railway power plant was slight but the car barns and four cars were completely demolished. The whole building is a mass of wreckage. Only one car can be repaired. The smoke stack and steam lines in the power house were shattered and workmen are busy today repairing them. Manager Louie Lanigan hopes to have the plant in



The Iola Electric Power Plant shown three times. Fires and floods have wrecked the line has operated for fifteen years. The sh[illegible] last night will be rebuilt and new cars will [illegible] smoke stack shown in the picture fell befor[illegible]

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DOCUMENT INFO

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Filename: 1918-03-01 Tornado property loss reported.pdf

DOCUMENT INFO

THE IOLA DAILY REG

VOLUME XXI. NO. 109. The Daily Register, Established 1897. The Weekly Register, Established 1901. IOLA, KAS., MARCH 1, 1918—FRIDAY EVENING. Successor to The Iola Daily Record an

TORNADO PROPERTY LOSS REPORTED

ALLEN COUNTY SUFFERED WORST FROM NEAR-HURRICANE.

YATES CENTER MUCH DAMAGED

PRESBYTERIAN CHURCH TO BE REBUILT AT ONCE.

Prime Western Officials Await Word from New York Offices—Street Cars to Run Soon.

The loss caused by the windstorm which nearly reached the proportions of a hurricane Wednesday night is now conservatively placed at one hundred thousand dollars. Confirmed reports from the nearby districts in the path of the storm indicates that none suffered as heavily as Iola and Elm township.

Wire service to Kansas City and neighboring districts was restored today. After a period of isolation of practically twenty-four hours from the outside world except through railroad lines, it has developed that many exaggerated rumors were widespread. One correspondent gave the report that one-half million dollars worth of property was damaged. Wierd stories of fires and wrecks were common. Tales to the effect that people were panic-stricken are absurd.

Today this section has apparently recovered from the shock. Allen county is in the area extending from northeast Oklahoma to southwest Iowa in which storms occurred according to weather reports. A terrific wind struck this section in a 69-mile gale which blew for one hour Wednesday night. Allen county received a rainfall of .58 inches. The rain broke a six-month drouth, the worst in history. The last rain fell in the latter part of August. Many heavy snows have visited this country but the precipitation [illegible]

THE WEATHER.

FORECAST FOR KANSAS: Fair tonight and Saturday, warmer tonight and mild temperature over Sunday.

Temperature—Highest yesterday 35, at 5 a. m.; lowest last night, 26, at 7 a. m.; normal for today, 36; deficiency yesterday, 6; deficiency since January 1st, 161.

Precipitation for the 24 hours ending at 7 a. m. today, .91; total for this year to date, 1.81 inches; deficiency since January 1st, .24 inch.

Relative humidity at 2 p. m. yesterday, 91 per cent; 7 a. m. today, 92 per cent; barometer reduced to sea level, 30.16 inches.

thrown out of employment at each plant. The pay on the furnaces ranges from three dollars per day to six. The monthly payroll at the two plants totals thousands of dollars.

The furnace workers especially are very anxious to hear the news from the company headquarters. The employees of these two plants have worked continuously for practically twenty years.

Street Cars Next Week.

Manager Louis Lannigan of The Iola Electric Railway Company expects to operate two cars by the first of next week at the latest. United Iron Works machinists and helpers are working on the steam "headers" and brick layers are rebuilding the smoke stack at the power house. As soon as these repairs are made the linemen will have the trolley wires up again. Lannigan has two cars, one in Iola and one in Gas ready to move as soon as the juice is turned on at the power house. The single truck car in the car barn will be repaired for use. The three big cars were wrecked beyond repair.

One of the most remarkable things about the Presbyterian church wreckage is that the four beautiful stained glasses on the north and south walls of the church remain unharmed. The south and west walls were damaged worst. The east and north walls will not be rebuilt in all probability. The bell in the tower fell and smashed the entrance of the edifice. The $10 000 pipe organ was crushed by the falling stone and brick. The lower hall was jammed full of the debris but the Sunday School room is practically uninjured.

Begin Work on Church at Once.

A meeting of the officers of the church was held yesterday afternoon and it was decided that just as soon

JAPAN'S PROPOSAL IS GIVEN ATTENTION

PRESIDENT WILL EXCHANGE VIEWS WITH ALLIES.

JAPAN WOULD BE WELCOME

BRITISH PAPERS BELIEVE THEY SHOULD BE TRUSTED.

Her Proposal Regarding Siberia is Widely Commented Upon by the London Newspapers.

(By the Associated Press)

Washington, Mar. 1.—Japan's proposal for action in Siberia has crowded General von Hertling's speech into second place in consideration of officials here and there were indications today that decisions were being formed which soon would show themselves in some arrangement of an international character to prevent the vast stores of Vladivostok and control of the trans-Siberian railway from falling into hands of the advancing Germans.

The expectation that President Wilson was planning to address Congress very soon in reply to von Hertling's speech was dissipated today by evidence that the President is making no such plans at this time and probably does not consider it necessary to reply to the German Chancellor for the present at least. Before the President speaks there doubtless will be an interchange of views with London and Paris so that if Mr. Wilson speaks he will express the view of all the co-belligerents as on previous occasions.

Outward indications today were that the President was studying the question of America's participation with the Japanese in Siberia, to the exclusion of other subjects.

London, March 1.—Japan's proposals with regard to Siberia and their reception at Washington has brought

German Anti-Tank Gun Captured by New Z

GERMAN ANTI-TANK GUN CAPTURED BY CANADIANS

This was the deadly weapon captured by New Zealanders on the British front in [illegible] there. It is an anti-tank gun, turreted and anchored like a large gun on a battleship. [illegible] tridges used on the tank guns, but the New Zealanders manage[illegible] to take it with the Ger

CONSUL LEAVES PETROGRAD

THE BRITISH AND FRENCH EMBASSIES ALSO DEPART.

Nothing But the Most Meagre Dispatches Are Coming Through From Russia.

British Steamer Torpedoed.

An Atlantic Port, Mar. 1.—The British freight steamship Manhattan of 804 tons gross, was torpedoed and sunk while in convoy of war ships and within hailing distance of an American merchant ship, it was learned today upon the arrival here of an American collier.

THE [illegible]

PAPE[illegible]

Chicag[illegible] by [illegible]

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inches. The rain broke a six-month drouth, the worst in history. The last rain fell in the latter part of August. Many heavy snows have visited this country but the precipitation was light. The rain and snow throughout the state was just in time to rescue the perishing wheat. The winter wheat was ready to give up the fight for life when the rain descended, giving more moisture than had previously fallen in six months. The precipitation was heavier than any former twenty-four hour period since August.

Telephone Wire Entanglement.

A view of the wreckage today shows several hundred telephone poles down. One of the most peculiar sights was between Iola and Gas where telephone poles are down on both sides of the line and the wire was twisted and wrapped around fences resembling barb wire entanglements used in modern warfare.

Scores of farmers were in town late yesterday afternoon and early this morning to file claims for loss of barns, outbuildings, farm implements, livestock and minor properties which were partially covered by tornado insurance.

Losses Only Partially Covered.

It was learned today that three of the heaviest losers in the storm, the Presbyterian church congregation, the Prime Western Smelter Company and The Iola Electric Railway Company held tornado and storm insurance policies but they were small. The Iola Electric Company did not have a policy covering the loss on the power plant and car barns. The Prime Western's loss was covered by half. The Presbyterian church was damaged to the extent of $20,000 and a policy of $5,000 partially covers the loss.

A canvass of the insurance men of the city reveals the fact that one hundred and seventy-five barns had been lost. It will be months before all the claims can be settled.

Seven Furnace Blocks Working.

The Prime Western officials in the local offices were unable to make any statement this morning whether or not the furnace sheds would be rebuilt. One of the officers from the general manager's office of Chicago arrived in Iola today. It is understood that they are awaiting the official sanction of the New York offices of the New Jersey Zinc Company, of which the local company is a subsidiary, before beginning work. It is estimated that it would take at least two months to replace the blocks. The furnace walls are undamaged and the retorts filled with the melting ore, which had been drawn only once by the metal drawers, have fallen to the bottom.

Only three blocks were operating at plant No. 3, three-quarters of a mile east of Iola. One was on dead-fire and another had not been operated for some time. All were lost by the fire, however. It is estimated that between ten and fifteen night men were on the job when the twister struck the sheds.

Begin Work on Church at Once.

A meeting of the officers of the church was held yesterday afternoon and it was decided that just as soon as the insurance adjuster had passed on the claim, plans would be made for rebuilding the church. Workmen were engaged at once in tearing down the loose brick and stone on the remaining walls to make the building safe. The benches and other furniture of the building have been placed under cover to prevent further loss.

It was announced that the regular Sunday morning service would be held in the Reformed church which the officers have so generously offered. According to previous arrangements a union service of the congregations of the Presbyterian and First Methodist churches will be held in the First M. E. church Sunday evening. Mr. Chas. F. Scott has been asked to address the united bodies on the subject "The History of the War" on this occasion.

Woodson Court House Struck.

Yates Center, Kas., Feb. 28.—For the first time in its history Yates Center and Woodson county were visited by a tornado Wednesday night which left a path of ruin and panic-stricken people in its wake. The big twister caused great damage but no estimate could be placed on the loss tonight.

The court house is badly wrecked and the grounds is a mass of debris. The Methodist church suffered much damage, the tower and a portion of the roof being torn off and the main auditorium flooded.

Town Left in Darkness.

The electric light plant was one of the first buildings to go, leaving the town in darkness and adding terror to the already frightened people. All communication with the outside world was cut off. Hail followed the wind and the rain which fell in torrents, increasing the damage wrought by the twister.

The roofs on many homes and business buildings were torn off, trees uprooted and dwellings damaged. Streets are strewn with broken glass and other debris.

Only a few days ago the Woodson County Stock Show Association made arrangements to lift the indebtedness on the show grounds. This morning the buildings were a mass of boards whirled and twisted into kindling wood.

Teacher Averted a Panic.

A panic at the high school gymnasium, where a basket ball game was in progress, was averted by the presence of mind of Miss Irma Lewis, music instructor, who forced the crowd to sing. The roof was blown off, but no one was injured.

The farm of H. T. Laidlaw, a prominent hay and cattle dealer, is a total wreck and many cattle are dead. The home of Mr. and Mrs. Anderson, south of the Santa Fe depot, is scattered all over an 80-acre field. Mr. Anderson was blown quite a distance, but was

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London, March 1.—Japan's proposals with regard to Siberia and their reception at Washington has brought the question of Japan's active participation in military operations to the forefront here, the developments dominating the news columns of the papers. A Reuter cablegram quoting an Associated Press dispatch from Washington is given great prominence in type and position by the morning newspapers and is commented upon extensively. Some papers display contributed articles setting forth the Japanese view of the situation.

The bulk of the opinion favors Japan's proposed action without qualification and the plea is made in some quarters that she ought implicitly to be trusted and given a free hand.

Sentence Again Extended.

(By the Associated Press)

Oklahoma City, Okla., March 1.—Inquiries addressed to the office of Governor R. L. Williams today disclosed the information that the stay of execution recently granted Quillie McConnell, self-confessed slayer of Sheriff George Arnold of Lincoln county, has again been extended, this time to April 26.

4,500 Ton Steamer Sunk.

(By the Associated Press)

New York, March 1.—The British merchant steamer Tiberia of 4,500 tons gross owned by the Anchor Line, was sunk by a German submarine about February 27 while bound for this port according to information received in shipping circles today. The crew was rescued.

Germans Attack on Aisne.

(By the Associated Press)

Paris, March 1.—After a violent bombardment last night the Germans made an attack on the Aisne front east of Chavignon, the war office announced. A violent hand to hand struggle followed terminating to the advantage of the French who threw back the Germans and inflicted heavy losses on them.

Government Buying Corn.

(By the Associated Press)

New York, March 1.—Corn to the amount of from five hundred thousand to 750 thousand bushels a day will be purchased during the next three weeks at the various mid-western grain exchanges by federal committees for use abroad, it was announced today.

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in the storm and the engineer blown from his seat and his face cut by flying glass. Wreckage piled on the track just south of Humboldt also delayed traffic. The Santa Fe stations at Cambridge, Longton, Grenola and Moline were unroofed. The operator at Cambridge was reported injured.

Moisture Helped Wheat.

Abilene, Kas., Feb. 28.—Sleet and wind last night and this morning

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...Americans Are Leaving... From Russia.

(By the Associated Press)

Stockholm, Feb. 28.—The American consul has left Petrograd where he remained after the embassy's departure, according to information reaching the American legation here. The consulate has been taken over by the Norwegian consul.

This bare report appears to indicate that the situation in Petrograd has taken an unexpected turn for the worst. In view of the fact that the latest previous messages from the Russian capital said that the American consul would remain there after the departure of the ambassador and his staff in order to keep in touch with the American legation here and the State Department.

News agencies, the press and diplomats here are without any but the most meagre dispatches from Petrograd in the last twenty-four hours.

London, Mar. 1.—The British and French embassies have left Petrograd according to a telegram from the Russian official news agency in Petrograd which bears no date.

The Russian Council of Peoples Commissaries has decided to return to Petrograd, the official Russian statement says.

Vologda, Russia, Feb. 28.—The American and Japanese ambassadors arrived here today on a special train. Their trip was an uneventful one. The Chinese and Siamese ministers, the Brazilian Charge d'affaires and the American Red Cross representatives have also arrived here. The ambassadors are remaining in Vologda pending developments. Another train which reached Petrograd with portions of the embassy staffs has arrived at Viatka (250 miles east of Vologda.)

Washington, Mar. 1.—The committee on public information announced today from official advices from its representative in Petrograd that Ambassador Francis and his staff, the American consulate, the military mission, and the Red Cross Representatives all left Petrograd for Vologda by railroad on the night of February 27th.

The advice came by cable from Edgar Sisson, the committee's representative in the Russian capital.

Representatives of the information committee, it was said today, will remain in Petrograd for the present to carry on the educational and informational work with which they are charged. Latest reports show that the circulation of the President's address on January 8 is practically completed throughout Russia. The total, it is said, is over four million copies, including separate printing and dis-

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...rival here of an American oil tanker.

MUST SEND ROAD BOOSTERS

Allen County Must Wake Up and Meet Ft. Scott-Wichita Highwaymen at Ft. Scott.

Road boosters of Allen county are out this week promoting interest in the Ft. Scott-Wichita highway meeting in Ft. Scott, Tuesday, March 5, which will be attended by J. Frank Smith, president of the Kansas Good Roads Association, and members of the Kansas State Highway Commission, with the view of securing a good delegation to represent the county at the approaching event.

Other counties have reported good delegations will be in attendance and it is time for Allen county to wake up to the realization that she must meet the other counties if she expects to be on the road map. The Wichita to Ft. Scott trail passes through Piqua, Iola, Gas, LaHarpe and Moran. Each of these towns and the countryside should be represented.

Several car loads are expected to go from Iola and Moran and the farmers who have cars are urged to drive over.

The meeting is of importance. Plans for a better road program on this entire route will be outlined. The road live wires of the state will be at the meeting. Allen county must fall in line. Your attendance at Ft. Scott will give reasonable assurance that you are boosting Allen county.

VISITED IOLA'S ELECTRIC PLANT

Committee of Ottawa Women Inspected Records and Filed Report.

The women of Ottawa are taking a hand in politics and there has been so much discussion about Iola's municipal light, power and gas plants that a committee of four women inspected the plants Wednesday, Feb. 27, visited with the commissioners and a two column report of the findings was made in the Ottawa Daily, the Herald.

Mrs. E. S. Sheldon, Mrs. Clarence A. Washburn, Miss Florence Robinson and Mrs. H. C. Dugan formed the party. The report covers the rates and system employed by the Iola commissioners deriving municipal funds from the plants.

Mooney Will Hang.

(By the Associated Press)

San Francisco, March 1.—Thomas H. Mooney must hang as a result of conviction on a murder charge growing out of bomb explosions which killed ten persons in 1916, unle

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Only three blocks were operating at plant No. 5, three-quarters of a mile east of Iola. One was on dead-fire and another had not been operated for some time. All were lost by the fire, however. It is estimated that between ten and fifteen night men were on the job when the twister struck the sheds. One fireman, one metal drawer, a "stuffer" in each block, and several watchmen and relief men were in the sheds also.

At the Gas City plant No. 1 four blocks were running and one was on dead-fire. All were a total loss. The night men fought the flames with the company fire-fighting apparatus but the water pressure was weak and there was small chance of saving the wooden structures under control of such a terrific wind, which changed its course at times. Between fifteen and twenty men were in the furnace houses at the plant.

Heavy Loss of Payroll.

It is estimated that fully eighty furnace men and one hundred ore men, mixers, yard employees, repairmen, fuel workmen and machinists were

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Unroofed Santa Fe Station.

Chanute, Kas., Feb. 28.—The terrific storm of last night unroofed smelters at Gas City, causing fires. The storm, which came from the west, swept a path twenty miles wide from Humboldt to Colony. At Petrolia, five miles north of Chanute, the engine house of the Kansas Natural pumping plant was unroofed and other damage done.

The Bell Telephone Company reports fifty-two poles down and the Western Union two hundred. A Santa Fe train from Kansas City was caught

[illegible] the Williams [illegible] disclosing the information that the stay of execution recently granted Quillie McConnell self-confessed slayer of Sheriff George Arnold of Lincoln county, has again been extended until June 10 April 26.

1,500 Ton Steamer Sunk.

(By the Associated Press)

New York, March 1.—The British merchant steamer Tiberia of 1,500 tons gross, owned by the Anchor Line, was sunk by a German submarine about February 27 while bound for this port, according to information received in shipping circles today. The crew was rescued.

Germans Attack on Ulcae.

(By the Associated Press)

Paris, March 1.—After a violent bombardment last night the Germans made an attack on the Ajesne front east of Chavignon, the war office announced. A violent hand to hand struggle followed terminating to the advantage of the French who threw back the Germans and inflicted heavy losses on them.

Government Buying Corn.

(By the Associated Press)

New York, March 1.—Corn to the amount of from five hundred thousand to 750 thousand bushels a day will be purchased during the next three weeks at the various mid-western grain exchanges by federal committees for use abroad, it was announced today.

in the storm and the engineer blown from his seat and his face cut by flying glass. Wreckage piled on the track just south of Humboldt also delayed traffic. The Santa Fe stations at Cambridge, Longton, Grenola and Moffitt were unroofed. The operator at Cambridge was reported injured.

Moisture Helped Wheat.

Abilene, Kas., Feb 28.—Sleet and wind last night and this morning wrecked over fifteen miles of telephone toll lines in the territory from Lincoln and Ellsworth to Topeka, causing $3,000 damage. While the moisture was light, it has been helpful to wheat, which is just turning green.

The Kansas City Southern yesterday afternoon repaired its lines south of here that were blown down in the wind-storm. The company reported the storm had damaged Amoret, Amsterdam, and Merwin, small Missouri towns about sixty miles south of Kansas City.

The Western Union Telegraph Company has been unable to establish connections with Moran and LaHarpe, Kas., where, according to a report received by the company, the railway depots of the Missouri Pacific were blown away.

grad in the last twenty-four hours.

London, Mar. 1—The British and French embassies have left Petrograd according to a telegram from the Russian official news agency in Petrograd which bears no date.

The Russian Council of Peoples Commissaries has decided to return to Petrograd, the ocial Russian statement says.

Vologda, Russia, Feb 28.—The American and Japanese ambassadors arrived here today on a special train. The trip was an uneventful one. The Chinese and Siamese ministers, the Brazilian charge d'affaires and the American Red Cross representatives have also arrived here. The embassadors are remaining in Vologda pending developments. Another train which reached Petrograd with portions of the embassy staffs has arrived at Vatka (350 miles east of Vologda.)

Washington, Mar. 1.—The committee on public information announced today from official advices from its representative in Petrograd that Ambassador Francis and his staff, the American consulate the military mission, and the Red Cross Representatives all left Petrograd for Vologda by railroad on the night of February 27th.

The advice came by cable from Edgar Sisson, the committee's representative in the Russian capital.

Representatives of the information committee, it was said today, will remain in Petrograd for the present to carry on the educational and informational work with which they are charged. Latest reports show that the circulation of the President's address on January 8 is practically completed throughout Russia. The total, it is said, is over four million copies, including separate printing and distribution and at Tiflis, Vladivostok, Odessa, Rostov, Omsk and Chita but not including 1,500,000 newspaper articles and an incalculable amount of partial printing and editorial comment which followed.

In addition, it was said 1,300,000 messages printed in German went through the northern lines of the German army. About 260 thousand were successfully worked through the southern and central fronts.

The committee also said that German and Austrian officers in Russia were provided with copies of the address.

Fair Food Board Meets.

The Iola fair food board will meet this evening in the city hall. Every merchant in Iola is urged to attend.

Other counties have reported good delegations will be in attendance and it is time for Allen county to wake up to the realization that she must meet the other counties if she expects to be on the road map. The Wichita to Ft. Scott trail passes through Piqua, Iola, Gas, LaHarpe and Moran. Each of these towns and the countryside should be represented.

Several car loads are expected to go from Iola and Moran and the farmers who have cars are urged to drive over.

The meeting is of importance. Plans for a better road program on this entire route will be outlined. The road live wires of the state will be at the meeting. Allen county must fall in line. Your attendance at Ft. Scott will give reasonable assurance that you are boosting Allen county.

VISITED IOLA'S ELECTRIC PLANT

Committee of Ottawa Women Inspected Records and Filed Report.

The women of Ottawa are taking a hand in politics and there has been no much discussion about Iola's municipal light, power and gas plants that a committee of four women inspected the plants Wednesday, Feb 27, visited with the commissioners and a two column report of the findings was made in the Ottawa Daily, the Herald.

Mrs. E. S. Sheldon, Mrs. Clarence A. Washburn, Miss Florence Robinson and Mrs. R. C. Dugan formed the party. The report covers the rates and system employed by the Iola commissioners deriving municipal funds from the plants.

Mooney Will Hang.

(By the Associated Press)

San Francisco, March 1.—Thomas J. Mooney must hang as a result of conviction on a murder charge growing out of bomb explosions which killed ten persons in 1916, unless executive clemency intervenes the state supreme court decided here today in denying his application for a new trial.

Huns Reach Dniester River.

(By the Associated Press)

Berlin, via London, Mar. 1.—German troops continuing their advance in Russia have reached the Dniester river, the war office announces. The Austro-Hungarian troops have begun an advance into Ukraine.

Sen Smith Not a Candidate.

(By the Associated Press)

Washington, Mar. 1.—Senator William Alden Smith, of Michigan, a Republican leader in the Senate, announced today that he would not be a candidate for re-election but would leave the Senate when his term expires March 4, next.

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A Monthly Magazine Published by The New Jersey Zinc Company

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Iola, Kan. J. W. HEYLMUN	Mineral Point, Wis. W. R. SMITH	Palmerton, Pa. A. CRANKSHAW	Silver City, N. Mex. W. G. RAMLOW

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It has been administered by the United States since 1900, and the record of the steps taken to safeguard the health of the inhabitants and to promote order and good government reflect great credit on the administration. The Virgin Islands, recently purchased from Denmark are three tiny islands lying east of Porto Rico and totaling together an area of only 138 square miles. Their population in 1911 was 27,086. In part their value is sentimental, in part strategic and political. Their population has been steadily declining, since their trade is small and the freed negroes who compose the population are of a poor order. They add little to the prestige and power of the United States, but their proximity to Porto Rico and the obvious interest Germany has been taking in the Islands made their acquisition a matter of statesmanship.

Zinc Notes

Canon City

F. F. Joel, who has been in charge of the metallurgical calculations at this plant for several years, and who has acted as local correspondent for ZINC, has been compelled to resign his position on account of ill health.

J. E. Overman, general forman, recently spent some time at Camp Kearney, California, visiting his son, who was formerly employed at this plant. The latter has been in military service for nearly two years, having spent considerable time on the Mexican border with the Colorado National Guard, and is now in an officers' training camp.

J. H. Galley, of the clerical force, is the proud possessor of a recently purchased Chandler "Chummy Roadster."

H. M. George, Chief Chemist, and his staff of assistants, are much pleased with the new laboratory.

Since the completion of the laboratory, L. A. Desjardins, who was its architect, and who had charge of the construction work, is temporarily occupied with other matters for the Canon City plant.

Cleveland

J. H. Haigh, of Denver, visited the Cleveland mine on business April 6.

C. T. Brown and Soren Ringlund were visitors at the Cleveland mine during the latter part of March.

Denver

E. E. Schwegler, of the Denver Accounting Dept., spent most of the month of April on an auditing trip to the Company properties in the Southwest.

W. M. Traver, Jr., formerly Mining Engineer at the Kelly mine has been promoted to the rank of corporal in Company C of the 28th Engineers.

On the afternoon of April 16th, the employees of the Denver Office listened to stirring speeches by Rev. A. H. C. Morse and Judge E. C. Stimson on the subject of the Third Liberty Loan.

John F. Bynon, of the Denver Engineering Department, expects to leave shortly for Southern California where he will enter training in the Hydroplane Service of the U. S. Navy.

W. S. Nicoll, of the Denver Purchasing Department, will leave the latter part of April for Camp Funston, Kansas, where he will enter the National Army.

Mr. R. R. May, of Gilman, Colorado, stopped for a few days in the Denver office during April enroute to Hanover, New Mexico, where he will be located for an indefinite period.

J. T. Boyd, of the Eagle mines, was a Denver visitor the fore part of April.

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Mr. and Mrs. W. C. Nestor and Mr. and Mrs. M. M. Dolan, both girls, via the Hospital.

Twenty-two cases over a wide territory were aided by the Franklin Hospital Auxiliary from June 1st to date according to a report just received. Twelve of these cases were surgical and ten were medical and embraced a variety of afflictions.

One bed fund is maintained by the borough of Franklin, one by Sussex and Wantage combined, and three by the Hospital Auxiliary for patients outside of these districts who need treatment and are unable to pay for it.

The distribution of the funds for the free beds were as follows from June to date: Franklin Hospital Auxiliary Bed, 12; Sussex and Wantage Free Bed, 5; Franklin Borough Free Bed, 5; The following towns were represented in this distribution: Newton, Sussex, Hamburg, Ogdensburg, Milton, Oak Ridge, Branchville, Wantage Township and Franklin.

The dance for the benefit of the Auxiliary which was held last Friday night was well attended, about 150 people being present. Exactly how much money was taken in at the affair has not yet been announced but it is estimated that it will reach around $80.00. Because of the bad weather the dance was given at the Neighborhood House instead of the Vocational School which is some distance away from the center of town.

Galena

The funeral of L. D. Adams was held on Saturday, March 23, and was largely attended by his many friends from here as well as the nearby towns and the mines. The floral pieces were particularly beautiful, and the casket was fairly covered with flowers. The pallbearers were George Baker, Roy Cole, Charles Gillette, E. Claussen, Theo. Polhemus, and W. F. Boericke. Among the honorary pallbearers were Messrs. Thacher, Hoskins, Place, Potter, Stoval, Pincon, Barrett, and Ware. Interment was made in Greenwood Cemetery, Galena.

John Christy, electrician for the Company, was badly shocked when working near the high tension line at the Penna mine, but after a few days layoff, was able to be about again, none the worse for the accident.

Mr. Thacher spent a few days in Galena with Mr. Hoskins.

Iola

The reconstruction of the furnace buildings at Works No. 3 is now completed and all the furnaces are in operation. Block No. 4 was charged on April 5th, Block No. 3 on the 14th and Block No. 2 and the refinery were charged on the 19th. The new buildings are better constructed than they were originally and the plant is in better condition than before the storm.

R. B. Boone, Jr., who has worked in the Iola offices for the past six years will leave soon after the first of May for Portland, Ore., and other points in the north-west where he expects to reside.

P. C. Class, who succeeded F. O. Russell in the Iola offices, has accepted a position with the Lehigh Portland Cement Co., of this city, and is succeeded by L. E. Rogers, of the Gas and Fuel Department.

Marion Dorsett, of Works No. 3, office has accepted a position with the Empire Gas Co., at Eldorado, Kans.

Word received from Howard Lawyer who recently left Iola offices to enlist in the clerical work of the aviation department at Waco, Tex., states he likes his work fine altho he is spending much time in digging trenches and doing other "clerical" work.

H. G. Hixon, of Chicago, and J. D. James, of Palmerton, arrived in Iola April 11th. Mr. James is superintending the operation of the new refinery during its early stages.

Mr. Coursen was in Iola the 12th and 13th of April.

E. B. Heylmun, formerly of the office at Works No. 3, and three other Iola boys were commissioned 2nd Lieutenants April 5th at Camp Doniphan after a strenuous three months course in the Officer's Training School. He is now at Camp Mills, L. I., ready for embarkation to France.

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Iola, Kan. L. E. ROGERS	Mineral Point, Wis. W. R. SMITH	Palmerton, Pa. A. CRANKSHAW	Silver City, N. Mex. C. A. MOORE

Gilman, Colo.
MISS NATALIE MESSEROLE

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Plan of Organization of The New Jersey Zinc Company*

It has been impossible for me to find time to prepare a formal paper to present at this meeting, but I believe in any event an informal talk, with opportunity for you fellows to ask any questions that occur to you, will lead to a better understanding of our plan of organization and the various duties of the individuals and units going to make up that organization; and that is the real object of my being here today.

Without going into the theory of, or the reasons for forming an organization along the lines we have adopted, I believe I can briefly describe The New Jersey Zinc Company's organization, and any points not clear will be gladly explained if you will interrupt me.

We do not by any means consider our organization a completed or an ideal piece of work. It has been our endeavor to plan an organization to take care of conditions at the time our plans were made, and to have the results so flexible that the necessary changes occuring through the expansion of the company's activities or through changed industrial conditions, can be made without altering the fundamental ideas underlying our plans.

With this understanding I will proceed with an outline of our organization as it exists.

At the top of the organization as we know it, stands our Board of Directors with the President of the company acting as Chairman. The Board of Directors represents the stockholders and is responsible to the latter, for the conduct of our business, the expenditure of moneys, and, in general, for the handling of the interests of the stockholders, so that their investment in our industry will yield them a proper return on such investment. The Board of Directors meets only once a month and consequently, in order to take care of questions arising between these monthly meetings, it has appointed an Executive Committee of four from its membership with the President of the company as chairman; this committee meeting once a week and taking action on all questions needing decisions, such decisions being comfirmed at the next meeting of the Board. In a great many companies the Chairman of the Board of Directors and the President of the company are two distinct offices, and I might cite as a typical example the U. S. Steel Corporation, where Mr. Gary is Chairman of the Board and Mr. Farrell is President. With us the President acts as Chairman of the Board, Chairman of of the Executive Committee and President of the company.

Reporting to the President are two Vice Presidents, one having charge of all departments having to do with finance, the sales of products, accounting, auditing, statistics, real estate and the general agreements and records of the company. The other having charge of all departments having to do with mining, manufacturing, engineering and research, ore and fuel purchasing, and general purchasing.

Each Vice President has a number of men reporting to him, who in general are known as the Heads of the General Departments. In our particular branch of the business the Vice President is known as the Operating Vice President as distinguished from the Financial Vice President. Reporting to the Operating Vice President, the heads of the general departments are known as General Managers of the particular general departments under their jurisdiction. For instance, Mr. Coursen is

* An informal talk to the members of the Technical and Manufacturing Departments by J. E. Hayes at Palmerton, September 19, 1918.

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General Manager of Manufacturing, having charge of all manufacturing; Mr. Singmaster is General Manager of Technical Department, having charge of all engineering and research work; Mr. Van Mater is General Manager of Mines, having charge of all mining work; Mr. Janeway is General Manager of Ore and Fuel, having charge of all ores and fuels for the company operations; Mr. Stone is Chief Metallurgist, acting as a consultant to the Vice President on all metallurgical questions; and Mr. Hardenbergh is General Purchasing Agent, having charge of all purchasing for the company.

In the case of the Purchasing Department and the Chief Metallurgist, which are both general departments, a concession to established custom, causes us to call Mr. Hardenbergh General Purchasing Agent and Mr. Stone Chief Metallurgist instead of standardizing their titles and calling them General Managers.

It has been found that in general it is not good policy to have more than six or seven diversified activities reporting to one man, and here comes in the question of elasticity of our plan of organization. You will note that it is perfectly feasible, should the size of our industry demand it, to have additional vice presidents, to have assistants to the vice presidents, and assistants to the heads of the general departments, and by this means to expand our organization to cover almost any expansion of the company's activities that any one can foresee, and this is a rather broad statement for some of us are dreaming of a vast broadening out and expansion of our business to cover the many branches of the zinc industry which have opened up under the changed conditions in the world of industry.

Reporting to the heads of the general departments are the heads of various groups of units going to make up the structure of The New Jersey Zinc Company's organization. In our end of the business these heads of groups are known as General Superintendents, and their work is further divided up into units such as plants or mines, each having a superintendent whose work is again subdivided into units in charge of foremen, and so on down until the unit becomes incapable of subdivision and we have reached the common laborer.

(Mr. Breyer asks for the names of the members of the Board of Directors and the Executive Committee).

Our Board of Directors is composed of the following gentlemen:

EDGAR PALMER, President of the company.
JOHN J. RIKER,
THOMAS D. JONES,
AUGUST HECKSCHER,
W. P. HARDENBERGH,
EDWIN S. MARSTON,
EDWIN M. SQUIER,
CHARLES W. COX,
A. B. SCHULTZ.

The Executive Committee is composed of the following directors:

EDGAR PALMER,
JOHN J. RIKER,
AUGUST HECKSCHER,
EDWIN M. SQUIER.

(Mr. Singmaster asks for a description of the routines for handling requests for appropriations and general instructions).

Requests for appropriations of money for capital investment have been covered in a routine which has worked very successfully and probably the best way to describe the working of the routine will be to take a typical example. Let us suppose, for instance, that somewhere in our organization the information has been gathered that there is a market for pharmaceutical zinc oxide with a possibility of making a profit for the company by the manufacture and sale of this product. This idea may come from the highest or lowest points in the organization, but eventually it reaches Mr. Singmaster as head of the Technical Department. He applies to the Operating Vice President for an authorization to make certain charges to the Engineering Expense Account and possibly to the General Experimental Account, in order to make plans

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and estimates for a phamaceutical oxide plant and to do experimental production work to determine the best methods of manufacture, this last in close cooperation with the Manufacturing Department. After the plans and estimates are completed to the satisfaction of the Engineering Department and the Manufacturing Department, the head of the unit where the product is to be made makes a formal request for an appropriation to cover the cost of erection of the plant in question, using the estimate of cost prepared by the Engineering Department and including any expense already authorized for engineering work. This formal request is handed to the head of the general department; in the case under consideration, to Mr. Coursen, as General Manager of Manufacturing, who discusses the project in all its details with the Operating Vice President. The latter being convinced that there is a profit to be made for the company by the manufacture of this product, passes along the request to the Executive Committee with his endorsement and such data as will give them complete information as to why we wish to expend the sum in question, how much profit we can make per year and any other data as to the advisability of the company expending moneys for the purpose suggested. The request is acted on favorably by the Executive Committee and the sum asked for is immediately available for starting the construction of the plant.

I have said the sum asked for is appropriated by the Executive Committee, because it is an almost unknown situation to have our Executive Committee disagree with us as to the advisability of a project, and this is the greatest compliment I can pay you fellows, for they are not a committee of figureheads, ready to approve anything that comes to them, but they have confidence in you—look out when you make a bad "bull", their attitude might change.

I have described this routine in detail as a typical one, and, of course, you understand it applies to all departments as well as to the Manufacturing Departments.

Now, as to our system of General Instructions, which Mr. Singmaster has asked me to describe—I might say at the outset that it is not our intention to have these looked upon as hard and fast rules and regulations for the carrying out of our business or for memorizing by any of the members of the organization. This latter would be a hopeless task, as you can see, when you look at our general instruction files, which are getting to be about the size of a city directory. Our idea in starting this routine was to have some method of disseminating through our entire organization, information or instructions regarding any subject, with certainty that it would automatically reach all those it should reach, without depending on any individual remembering to properly transmit it. A second, and just as important reason for the routine, is to have on file, instructions on general subjects, so as to insure a standard method of handling a recurring subject—a place to turn to when the question arises "how shall this be handled". As an example of the kind of subject covered by general instructions and the method of handling the instructions themselves, let us take the general subject of "traveling expenses". Now, bear in mind that an instruction may originate anywhere in the organization, but it is started on its course by one of the Vice Presidents when he puts it in a general instruction.

Let us suppose that Mr. Kelsey, as superintendent of the Palmerton works, has trouble in handling the question of traveling expenses of some of his men. He formulates his troubles and his ideas as to how to cure them; the latter, it seems, would be applicable to the entire company and an instruction is written in the most general terms possible, covering—the methods employees should adopt when traveling for the company, how such expenses should be reported, what forms are to be used in so reporting, and the allowable expenses for company account. This instruction is issued in the General Instruction Series and is automatically distributed to the Heads of the General Departments. Each of the latter

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automatically reissues the general instruction in his series of Departmental Instructions; it thus reaches the units reporting to him and the head of each unit automatically reissues in the unit's series of instructions; and so on down to the smallest subdivision. It may be stopped at any point in its various courses, because it does not apply lower down, or it may continue until it appears on the plant bulletin board in various languages for the information of the lowest portions of the organization. In the case of our example it would probably stop at the chiefs of departments in the Manufacturing Department, and in the Technical Department would continue to every member of the department.

Some of the subjects covered by general instructions we have always with us, such as traveling expenses. Others are temporary subjects, such as methods of handling claims for exemption on industrial grounds. In order to handle these different kinds of subjects we have two classes of General Instructions, A and B—the former being issued on white paper and the latter on pink. The latter are cancelled as soon as the temporary conditions have ceased to exist; the former stand until superceded or modified by supplement or appendix, and such modifications can be made at any time by issuing a supplement or appendix in the same way the original instruction was issued.

This routine has proved of enormous value to us during the past few years, when it has been necessary frequently to advise the entire organization regarding a new method or a change in some standard method of handling matters.

I have not followed through in detail the branch of the organization reporting to the Financial Vice President as in all essential details it has the same structure as our branch. The heads of the General Departments are known as Secretary, Treasurer, General Sales Manager, Comptroller and General Counsel, instead of General Managers, but the form of organization is the same and all routines and methods prescribed by the general instructions apply in the same way.

(Mr. Singmaster asks why the company operates under various names in different localities).

The New Jersey Zinc Company is the parent company and its lines of organization and routines carry through all the subsidiaries. The reasons for the existence of those subsidiaries will be found in the various State laws governing corporations. I want to impress upon you that there is no subterfuge here—we are not hiding behind some other name with ulterior motives.

Let me again use an example to illustrate. The laws of Pennsylvania do not permit a corporation, incorporated in another State, to own real estate in Pennsylvania—it is therefore necessary for us to form The New Jersey Zinc Company (of Pa.) in order to own the Palmerton Plants; there is no concealment here, the latter company does not make any money, but turns its product over to the parent company at cost. And so will be found a similar reason wherever we operate under another name than that of The New Jersey Zinc Company.

(Mr. Breyer asks for some idea of the company's policy as to expansion, broadening out and the manufacture of new products.)

There are two different kinds of companies in my experience, one where all policies, all growth, all activities, originate at the top, and the organization is a machine which puts those ideas into effect. Another kind, where "the top" on account of long experience becomes a counsellor and guide, a director of effort and energy into the proper channels, a controller of excess enthusiasm and a spur to greater activity. The ideas, the development of those ideas and the opening up of new avenues depend on the organization itself.

We are decidedly of the latter sort—so the best answer I can make to that question is, that it is up to you fellows. Go the limit as long as your activity is related to zinc or the by-products occurring during the operations of mining, milling and smelting it.

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GRANTOR:	Prime Western Spelter Company
GRANTEE:	J.B. Kirk Gas and Smelting Company
INSTRUMENT:	Warranty Deed
DATE:	12/16/1920
BOOK:	70
PAGE:	455
PARCELS:	1, 4, 3, 5

Filed 70, Pg 455

Deed

This Indenture Made this 16th day of December in the year of our Lord one thousand nine hundred and twenty (1920) between The Prime Western Spelter Company, a corporation of the State of Missouri, party of the first part, and The J.B.Kirk Gas & Smelting Company, a corporation of the State of ..... party of the second part,

Witnesseth , That the said party of the first part in consideration of the sum of One Dollar ($1.00) and other valuable considerations to it duly paid, receipt whereof is hereby acknowledged has sold and by these presents does grant and convey unto the said party of the second part its successors and assigns, the following described land and premises situate in Allen County,Kansas, to-wit,

All that part of the SoutheaSt Qdarter (1/4) of Section twenty-five (25) Township twenty-four (24) RAnge eighteen (18) east of the Sixth P.M.more particulaRly described as follows,to-wit,

Commencing at the southwest corner of the Southeast quarter (1/4) of above described Section, thence East twenty (20) rods, along the South line of said Quarter Section, thence North one hundred twenty (120) rods, thence WEst twenty (20) rods to the WEst line of said Quarter Section, thence due South one hundred twenty (120) rods to the place of beginning containing fifteen (15) acres, being the same premises conveyed to the party hereto of the first part by Mary E. Northrup by deed dated June 27,1920, and recorded in the office of the register of deeds in and for Allen County Kansas, on July 1, 1902, in book 33 on page 628.

EXcepting therefrom all oil, gas and mineral which has heretofore been conveyed by the party hereto of the first part to The Elm Township Gas, light, Fuel & Power Company by deed dated February 17, 1906.

The above described premises are conveyed subject to a track agreement dated Mar.1, 1917 made between the party hereto of the first part and the Missouri Pacific Railway Company and subject also to a right of way of the Missouri Kansas & Texas Railway Company.

Also all that certain other tract or parcel of land situate in the said County of Allen and State of Kansas, to wit,

That part of the southwest quarter (1/4) of Section twenty-five (25) Township twenty-four (24) RAnge eighteen (18).

Commencing at a point seven hundred twenty-five (725) feet west of the Southeast corner of said Quarter Section, thence west three hundred seventy nine (379) feet more or less, thence North one thousand forty-four (1044) feet, thence East Three hundred seventy-nine feet more or less,thence South to place of beginning, being a tract three hundred seventy-nine (379) feet wide, more or less, and ten hundred forty-four (1044) feet long, containing about nine acres, and subject to the right of way and tracks as now located of the Missouri Pacific RAilway Company and the Missouri, Kansas & Texas Railway Company, being the same premises conveyed by The Iola Portland Cement Company by deed dated MAy 25, 1915,and recorded in the office of the said Register of Deeds on the 21st day of August 1915, in book 43 on page 75.

The above described premises are conveyed subject to a track agreement dated March 1, 1917 made between the party heretoof the first part and the Missouri Pacific Railway Company.

Also all that certain other tract or parcel of land situate in the said County of Allen and State of Kansas is described as follows, to-wit,

That part of the Southwest quarter (1/4) of Section twenty-five (25) Township Twenty-four (24) Range Eighteen (18).

Commencing at a point seven hundred (700) feet West of the Southeast corner of said Quarter Section, thence west twenty-five (25) feet, thence North one thousand forty-four (1044) feet, thence East twenty-five (25) feet, thence South to place of beginning, being a tract twenty-five (25) feet wide, lying immediately WEst and adjoining a tract heretofore sold to the grantor herein, being the same premises conveyed to the party of the first part by said The Iola Portland Cement Company by deed dated May 25, 1915, and recorded in the office of said Register of Deeds on August 21,1915, in book 59 on page 164.

Also all that plot or parcel of land situate in the said County of Allen and State of Kansas, to-wit,

Beginning at a point eleven hundred and five (1105) feet west of the Northeast corner of the Southeast quarter (1/4) of Section thirty-two (32) Township twenty-four (24) Range nineteen (19) thence running West thirty-eight one-hundredths (10.38) chains, thence east thirteen and one-half (13-1/2) chains, thence North ten and thirty-eight one hundredths (10.38) chains to the point of beginning, being part of the same premises conveyed to the party hereto of the first part by Mark T.Cox and Emily M.Cox, his wife, by deed dated October 30,1902, and recorded in the office of the said Register of Deeds on April 18, 1903 in book 30 of Deeds on page 352.

The premises lastly above described are conveyed subject to a right of way to the Missouri PAcific Railway Company and subject also to Industrial Track Agreement with Missouri Pacific Railway Company dated March 10, 1917.

Also all that tract or parcel of land situated i n the said County of Allen and State of Kansas and described as follows, to-wit,

lots No. Seven (7) and No. Eight (8) Block No. Two (2) in Taylor's second addition to Gas City, Kansas, according to the recorded plat thereof. Being the same premises conveyed to the party hereto of the first part by deed dated February 5, 1903, by E.K.Taylor, and recorded in the office of the said Register of Deeds on February 13, 1903, in book 37 at page 124. -

Excepting, however, from the premises lastly above described, all the oil, gas and mineral in and under said lands, and further excepting all rentals or dues that may accrue upon or under any oil, gas or mineral leases that are upon said land or any part of the same.

Also all that tract or parcel of land situated in the said Countyof Allen and State of Kansas and described as follows, to-wit,

U.S.R.S. CANCELLED $ 15.00

EPA7-001721

lot No. Five (5) Block No. Four (4) in the town of Rose Hill as shown on Plat filed in the office of the Recorder of Deeds of aforesaid County and State. Being the same premises conveyed to the party hereto of the first part by William A. West and Laura West, his wife, by deed dated August 16, 1902, and recorded in the office of the said Register of Deeds on August 22, 1902, in Book 36 at page 77.

Excepting from the premises lastly above described all oil and gas in and under the same, which said oil and gas were reserved tosaid William A. West and Laura West, his wife, by the last hove mentioned deed.

Also all the right, title, interest of the said Prime Western SPelter Company in and to all of the following described real property situated in the said County of Allen and State of Kansas, to-wit,

lots No. One (1) and No. Two (2) in Block Four (4) in the town of Rose Hill as shown on the plat filed in the office of the Register of Deeds of said County and State. Being the same premises conveyed to the party hereto of the first part by Carrington Ward Sexton by deed dated June 13, 1904, and recorded in the office of the said Register of Deeds on December 6, 1920. 4

The premises lastly above described are conveyed subject to a certain oil and gas lease as shown of record.

Also all that tract or parcel of land situated in the said County of Allen and State of Kansas and described as follows, to-wit,

lot No. Six (6) Block No. Four (4) in the town of Rose Hill as shown by the recorded plat thereof. Being the same premises conveyed to the party hereto of the first part by lAura A. Scruggs and Greos V. Scruggs, her husband, by deed dated February, 11, 1903, and recorded in the office of the said Register of Deeds on February 13, 1903, in book 34 at page 334.

Also all that tract or parcel of land situated in the said County of Allen and State of Kansas described as follows, to-wit,

The South half (1/2) of the Southwest quarter (1/4) of the Northeast quarter (1/4) of section thirty-two (32) Township twenty-four (24) Range nineteen (19) Allen County, Kansas. Being the same premises conveyed to the party of the first part by Joesph A. DAly and Ollie Daly hiswife, and Leander T. McRae and Florence D. McRae, hiw wife, by deed dated December 1, 1898, and recorded in the offioe of the REgister of Deeds on December 10, 1898, in Book 23 of Deeds at page 305. 1

The premises lastly above described are conveyed subject to the right of way of The Missouri Pacific RAilway CoMpany, subject also to the right reserved by the grantors in the last above mentioned deed to pipe gas or water over or across said land, subject also to lease made by the party heretoof the first part to The Kansas & Colorado Pacific RAilway Company, dated January 31, 1902, subject also to and with the benefit of a certain agreement made between B.F. Bush as receiver of the Railroad and other property of The Missouri Pacific Railway Company and the party hereto of the first part, dated March 10, 1917, subject also to an oil loading right more fully described in a certain agreement between the party of the first part and The Miller Pipe-line Company, dated November 21, 1919.

Also all that tract or parcel of land situate in the said County of Allen and State of Kansas and described as follows, to-wit,

All that part of the Southwest quarter (1/4) of Section twenty-five (25) Township twenty-four (24) RAnge eighteen (18) east of the 6th P.M. described as follows, Beginning at the Southeast Corner of said Southwest Quarter (1/4(thence North ten hundred and forty-four (1044) feet, thence West seven hundred and twenty-five (725) feetm thence South ten hundred and forty-four (1044) feet to the South line of said Quarter Section, thence East seven hundred Twenty-five (725) feet to the place of beginning, containing seventeen and one fourth (17-1/4) acres, more or less.

Being part of the premises conveyed to the parties hereto of the first part by George K. Nicholson and Florence B. Nicholson, his wife, by deed dated July 1, 1902, and recorded in the office of the said Register of Deeds on July 1, 1902, in Book 33 of deeds at page 626.

The premises lastly above described are conveyed subject to a track agreement made between the party hereto of the first part and Missouri Pacific Railway Company, dated March 1, 1917, and subject alsoto the right of way and tracks of the said Railway Company and of the Missouri Kansas & Texas Railway Company now located thereon.

Also all the right, title and interest of the said Prime Western Spelter Company in and to all of the following described real estate, situated in the said County of Allen and State of Kansas, to-wit,

Commencing at a point in the center of the Missouri Pacific Main track and 1996 feet west of the East quarter (1/4) corner of Section thirty-two (32) Township twenty-four (24) Range Nineteen (19) being the Northwest corner of Prime Western Spelter's Company&s tract, thence South 89° 13' west (vary 9° 16'E) 650.4 feet to the west line of the Southeast quarter (1/4) of said Section 32, thence South 0° 45' East 1309.2 feet to the South line of the North one-half (1/2 of the Southwest quarter (1/4) of said Section 32, thence North 89° 20' East 1541.2 feet, thence North 0° 44' west 624 feet to the Southeast cornor of the Prime Western Spelter Company's tract, thence South 89° 13' west 891 feet to the Southwest cornor of Prime Western Spelter Company's tract thence North 0° 47' West 687 feet to the place of beginning, containing 32.32 acres, more or less. Being the same premises conveyed to the party hereto of the first part by Carrington Ward Sexton, by deed dated September 28, 1904, and recorded in the office of the said Register of Deeds on December 6, 1920. 5

The premises lastly above described are conveyed subject to one(1) certain oil and gas lease as shown of record.

To Have and To Hold the above granted premises, together with the appurtenances unto the said partyoof the second part, its successors and assigns, forever.

And the said party of the first part does covenant and agree that at the delivery hereof it is the lawful owner of the premises above granted and seized of a good and indefeasibl estate of inheritance therein, free from all encumbrances except as herein recited and that it will warrant and defend the same in the quiet and peaceful possession of the said party of the second part, its successors and assigns forever, against all persons lawfully claiming the same. subject as aforesaid.

In Witness Whereof, the said party of the first part has caused its corporate seal t he hereunto affixed and these presents to be subscribed by its Vice President and Assistant Sec retary the day and year first above written.

Prime Western Spelter Company,
By A.P.Cobb, Vice President.

Attest Seal, R.G.Hudson, Assistant Secretary.

State of New York, County of New York, ss

Be it remembered that on this 16th day of December,1920, before me, the undersign a Notary Public in and for the County and State aforesaid, came A.P.Cobb, Vice President of Prim Western Spelter Company, a corporation duly organized and incorporated and existing under and by virtue of the laws of the State of Missouri, and R.G.Hudson, Assistant Secretary of said corporat and who are personally known to be the persons who executed as such persons the within instrument of writing on behalf of said corporation, and such persons duly acknowledged the execution of th same to be the act and deed of said corporation.

In Testimony Whereof, I have hereunto set my hand and affixed my notarial seal the da and year last above written.

Anne T. Mulry, Notary Public
Commssion expires March 30th,1921.

Filed the 7th day of Jan,1921 at 1.10 P.M
lena O. Brown, Register of Deeds.

Anita Brown, Deputy

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Guardian's Deed

This Indenture, Made this 15th day of Decembsr,1920, between Maude S. Moore as Guardia of Louise Moore and Ralph Stephens Moore, both single and minors of Allen County, State, of Kans party of the first part, and Sarah L. Rowden formerly Sarah L. Moore of Allen County, State of Kansas party of the first par Second part.

Witnesseth, That the said party of the first part, by virtue of an Order of Sale made i issued by the Probate Court of Allen County, State of Kansas, and dated the 22nd day of Septembsr 1920 has sold to the said party of the second part the real property hereinafter described, in co formity to law and to said Order of Sale, for the sum of Three Hundred Twelve and 50/100 Dollars, which sum is more than three fourths of the appraised value of said real property, and said Court has duly approved and confirmed said sale, and ordered the said party of the first part to make a deed for said premises so sold to the said purchaser.

Now, Therefore, In consideration of the sum of Three Hundred Twelve & 50/100 Dollars an by virtue of the powers in him vested by law and the aforesaid orders of said Court, the said par of the first part, as Guardian as aforesaid, does hereby grant, bargain, sell and convey, unto th said party of the second part, her heirs and assigns, forever, all the right, title and interest the said Louise Moore and Ralph Stephens Moore in and to all of the following described real prop erty, situated in Allen County, State of Kansas, to-wit, All their undivided one-sixteenth (1/16 of lot Four (4) Block One Hundred Seventeen (117) city of Iola, Kansas, also, All their undivided one-eighth (1/8) of lot one (1) Block One Hundred Seventeen (117) City of Iola, Kansas, all acc- ording to the recorded plat thereof.

To Have and To Hold the above granted premises, together with the appurtenances, unto t said partyof the second part, her heirs and assigns, forever.

In Witness Whereof, The said party of the first part has hereunto set her hand, the day and year first above written.

Maude S. Moore,
Guardian of Louise Moore and Ralph Stephens Mo- minors.

State of Kansas, Allen County, ss

Be it remembered, That onthis 15th day of December,1920, before me, the undersigned, a Notary Public in and for said County and State, cameMaude S. Moore, Guardian of Louise Moore an RAlph Stephens Moore, both single and minors who is peronally known to me to be the same person who executed the foregoing deed, and duly acknowledged the execution of the same.

In TEstimony Whereof, I have hereunto subscribed my name and affixed my official seal, the day and year last above written.

J.B.Smith, Probate Judge.

State of Kansas,
Allen County, ss In The Probate court of said County.

Be it remembered, That on this 15th day of December,1920, the within and fore going DeeD was returned to this Court, and in open Court the sale of the premises therein describ and the said Deed were approved and confirmed by the Court.

In Testimony Whereof, I have hereunto subscribed my name and affixed the seal of said Court on the day and year last above written.

J.B.Smith, Probate Judge.

Filed the 7th day of Jan. 1921 at 3 P.M
Lena O. BRown, Register of Deeds

DOCUMENT INFO

EDFolder: D:\Question 08\NJZ Published Sources\

Filename: 1944-12 War Minerals Report 305.pdf

DOCUMENT INFO

UNITED STATES DEPARTMENT OF THE INTERIOR
Harold L. Ickes, Secretary

BUREAU OF MINES
R. R. Sayers, Director

War Minerals Report 305

IOLA ZINC RESIDUES

ALLEN COUNTY, KANS.

WASHINGTON, 1943

EPA7-001724

The War Minerals Reports of the Bureau of Mines are issued by the United States Department of the Interior to give official expression to the views reached on various investigations relating to domestic minerals. These reports are based upon the field work of the Bureau of Mines and upon other data available to the Department from other sources. The primary purpose of these reports is to provide essential information to the war agencies of the United States Government and to assist owners and operators of mining properties in the production of minerals vital to the prosecution of the war.

IOLA ZINC RESIDUES
Allen County, Kans.

SUMMARY

From 1898 to 1918, zinc retort furnaces operating in the vicinity of Allen County, Kans., accumulated a considerable tonnage of residues. Seven dumps, with an indicated reserve of 98,616 tons containing an average of 4.37 percent zinc and 24.56 percent fixed carbon after all large pieces of retorts and bricks had been removed, were sampled recently by the Bureau of Mines. Laboratory tests indicate that the residues are amenable to treatment by the Waelz process. The addition of carbon is unnecessary, and recoveries average more than 90 percent.

The Iola zinc residues constitute a reserve of approximately 4,222 tons, of which 3,800 tons could be recovered as zinc oxide in a Waelz plant. Cost of production would be comparatively high, however.

INTRODUCTION

The Iola dumps comprise the residues from 7 abandoned zinc retort furnaces situated within a radius of 5 miles of Iola, Kans. (Fig. 1.) They were examined and sampled by engineers[1] of the Bureau of Mines during September and October 1943. J. B. Kirk, of Iola, Kans., owns or has leased the dumps and plans to erect a Waelz plant provided conditions warrant. The dumps are situated as follows:

No. 1, NW 1/4 NW 1/4, sec. 34, T. 24 S., R. 18 E.
No. 2, SE 1/4 NE 1/4, sec. 27, T. 24 S., R. 18 E.
No. 3, N 1/2 SE 1/4, sec. 27, T. 24 S., R. 18 E.
No. 4, SE 1/4 SW 1/4, sec. 25, T. 24 S., R. 18 E.
No. 5, SW 1/4 NE 1/4, sec. 32, T. 24 S., R. 19 E.
No. 6, SE 1/4 NE 1/4, sec. 32, T. 24 S., R. 19 E.
No. 7, N 1/2 SE 1/4, sec. 32, T. 24 S., R. 19 E.

Iola, with a population of 7,000, is the business center for an extensive farming area. The surrounding country is an almost level plain with [illegible] timber. Normally, labor is plentiful and cheap, but, owing to [illegible] most of the labor surplus has migrated to larger cities.

[1] [illegible] and A. O. Wilson, mining engineers.

EPA7-001725

IOLA ZINC RESIDUES
Allen County, Kans.

SUMMARY

From 1898 to 1913, zinc retort furnaces operating in the vicinity of Iola, Allen County, Kans., accumulated a considerable tonnage of residues.

Seven dumps, with an indicated reserve of 96,516 tons containing an average of 4.37 percent zinc and 24.55 percent fixed carbon after all large pieces of retorts and bricks had been removed, were sampled recently by the Bureau of Mines. Laboratory tests indicate that the residues are amenable to treatment by the Waelz process. The addition of carbon is unnecessary, and recoveries average more than 90 percent.

The Iola zinc residues constitute a reserve of approximately 4,222 tons of zinc, of which 3,800 tons could be recovered as zinc oxide in a Waelz plant. Cost of production would be comparatively high, however.

INTRODUCTION

The Iola dumps comprise the residues from 7 abandoned zinc retort furnaces situated within a radius of 5 miles of Iola, Kans. (Fig. 1.) They were examined and sampled by engineers[1] of the Bureau of Mines during September and October 1943. J. B. Kirk, of Iola, Kans., owns or has leased all the dumps and plans to erect a Waelz plant provided conditions warrant it. The dumps are situated as follows:

No. 1, NW 1/4 NW 1/4, sec. 34, T. 24 S., R. 19 E.
No. 2, SE 1/4 NE 1/4, sec. 27, T. 24 S., R. 19 E.
No. 3, N 1/2 SE 1/4, sec. 27, T. 24 S., R. 19 E.
No. 4, SE 1/4 SW 1/4, sec. 25, T. 24 S., R. 19 E.
No. 5, SW 1/4 NE 1/4, sec. 32, T. 24 S., R. 19 E.
No. 6, SE 1/4 NE 1/4, sec. 32, T. 24 S., R. 19 E.
No. 7, N 1/2 SE 1/4, sec. 32, T. 24 S., R. 19 E.

Iola, with a population of 7,000, is the business center for an extensive farming area. The surrounding country is an almost level plain with virtually no timber. Normally, labor is plentiful and cheap, but, owing to war activities, most of the labor surplus has migrated to larger cities.

1 C. C. Knox and A. O. Wilson, mining engineers.

EPA7-001726

Smelting of zinc ores began in Iola about 1898, and in a short ti seven smelters were in operation. This unusual concentration of smelt plants in a small town was due largely to a plentiful supply of cheap natur gas at Iola. Many gas wells were not more than 500 feet deep

The gas field was exhausted about 1913, and the smelting indust moved elsewhere. During the 15 years of operation, a large tonnage zinc-retort residues accumulated. Part of these has been hauled away road ballast, and during the first World War some was shipped to wes smelters for retreatment, so that at present only about one-third of material originally in the dumps remains.

EXPLORATION AND PROBABLE RESERVES

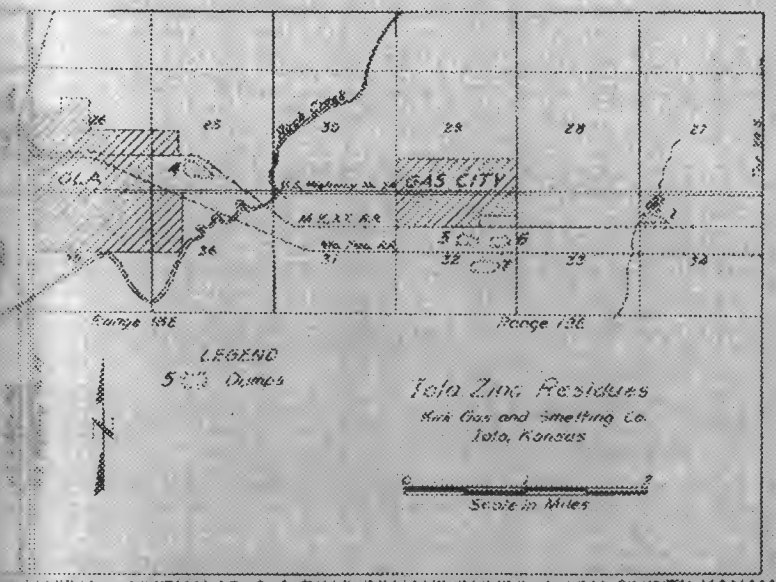
With the aid of Alex Stroup, City Engineer of Iola, a grid system laid out on each dump to aid in establishing the location of the samp Stroup also ran a topographic survey of each dump and, with the data obtained from auger holes, calculated the volume of material in each du

A total of 174 auger holes was drilled and sampled. Locations of holes are shown on figures 3 to 6. All foreign material, such as br retorts, etc., was removed from the cuttings, and records were kept of amount of such material found in each hole. Samples were analyzed zinc, fixed carbon, volatile matter, and ash. Of the 174 samples, 134 from the main dumps, and the remaining 40 samples were from mate scattered around the old furnace foundations and ore bins. Although 107 tons of material was measured, the dumps contain many broken retorts other materials which must be screened out before treatment. After ducting 10 percent for such foreign material, the indicated reserves a to 96,816 tons, which will average 4.97 percent zinc and 24.59 percent bon. Table 1 gives a summary of tonnage and grade of the Iola zinc r dues.

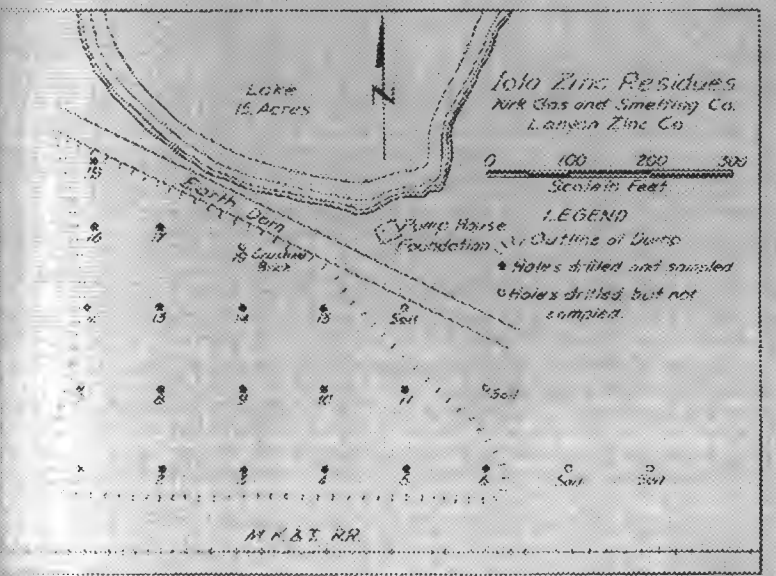
Dump No. 1 contains 58,279 tons of material averaging over 5 cent zinc, and this is considered the minimum grade of material that be handled economically.

Forty samples taken from residues remaining around the old f dations average about 5.5 percent zinc. There is approximately 75, tons of this material, but it is composed largely of bricks, retorts, c crete, etc., and it is doubtful if the total amount suitable for retreat would exceed 20,000 tons. The high cost of handling probably would than offset its higher grade; therefore, this tonnage is not included in reserves.

Detailed data on sampling are on file at the Rolla, Mo., and Washi ton, D. C., offices of the Bureau of Mines, where they may be consulted authorized persons.



GENERAL LOCATION OF IOLA ZINC RESIDUE DUMPS, ALLEN COUNTY, KANSAS



IOLA ZINC RESIDUES DUMP NO. 1, ALLEN COUNTY, KANSAS

EPA7-001727

Smelting of zinc ores began in Iola about 1898, and in a short time seven smelters were in operation. This unusual concentration of smelting plants in a small town was due largely to a plentiful supply of cheap natural gas at Iola. Many gas wells were not more than 500 feet deep

The gas field was exhausted about 1913, and the smelting industry moved elsewhere. During the 15 years of operation, a large tonnage of zinc-retort residues accumulated. Part of these has been hauled away for road ballast, and during the first World War some was shipped to western smelters for retreatment, so that at present only about one-third of the material originally in the dumps remains.

EXPLORATION AND PROBABLE RESERVES

With the aid of Alex Stroup, City Engineer of Iola, a grid system was laid out on each dump to aid in establishing the location of the samples. Stroup also ran a topographic survey of each dump and, with the data obtained from auger holes, calculated the volume of material in each dump.

A total of 174 auger holes was drilled and sampled. Locations of the holes are shown on figures 2 to 8. All foreign material, such as brick, retorts, etc., was removed from the cuttings, and records were kept of the amount of such material found in each hole. Samples were analyzed for zinc, fixed carbon, volatile matter, and ash. Of the 174 samples, 134 were from the main dumps, and the remaining 40 samples were from material scattered around the old furnace foundations and ore bins. Although 107,351 tons of material was measured, the dumps contain many broken retorts and other materials which must be screened out before treatment. After deducting 10 percent for such foreign material, the indicated reserves amount to 96,616 tons, which will average 4.37 percent zinc and 24.55 percent carbon. Table 1 gives a summary of tonnage and grade of the Iola zinc residues.

Dump No. 1 contains 32,279 tons of material averaging over 5 percent zinc, and this is considered the minimum grade of material that can be handled economically.

Forty samples taken from residues remaining around the old foundations average about 5.5 percent zinc. There is approximately 75,000 tons of this material, but it is composed largely of bricks, retorts, concrete, etc., and it is doubtful if the total amount suitable for retreatment would exceed 20,000 tons. The high cost of handling probably would more than offset its higher grade; therefore, this tonnage is not included in the reserves.

Detailed data on sampling are on file at the Rolla, Mo., and Washington, D. C., offices of the Bureau of Mines, where they may be consulted by authorized persons.

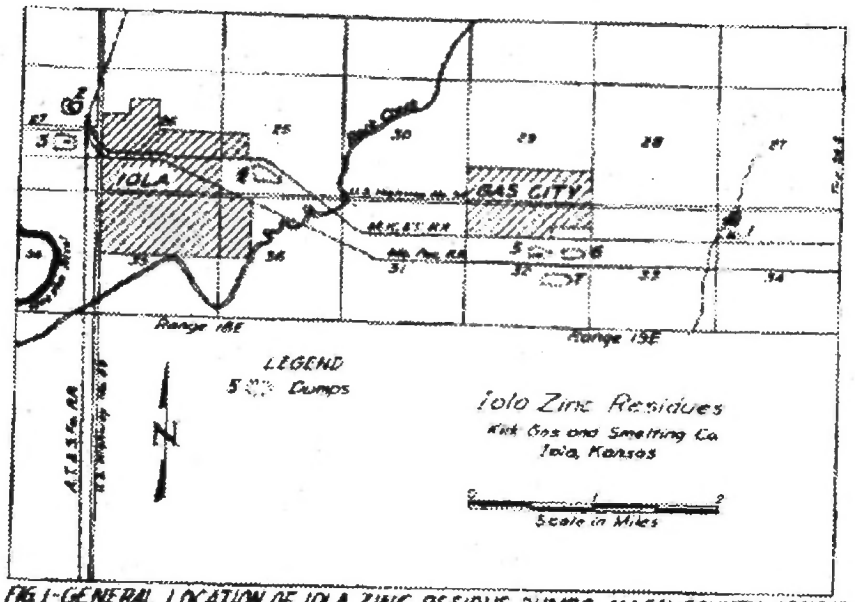


FIG. 1-GENERAL LOCATION OF IOLA ZINC RESIDUE DUMPS, ALLEN COUNTY, KANSAS

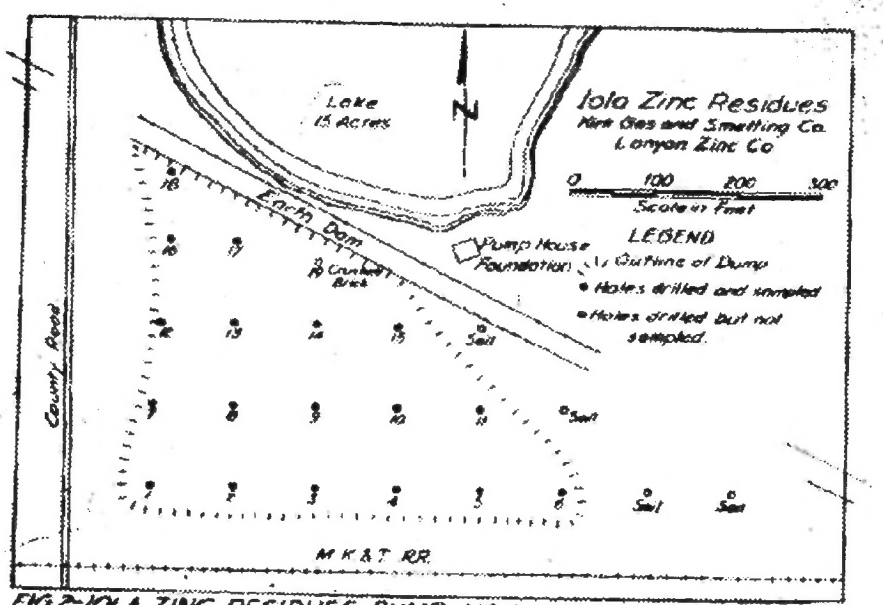


FIG. 2-IOLA ZINC RESIDUES DUMP NO. 1, ALLEN COUNTY, KANSAS

EPA7-001728

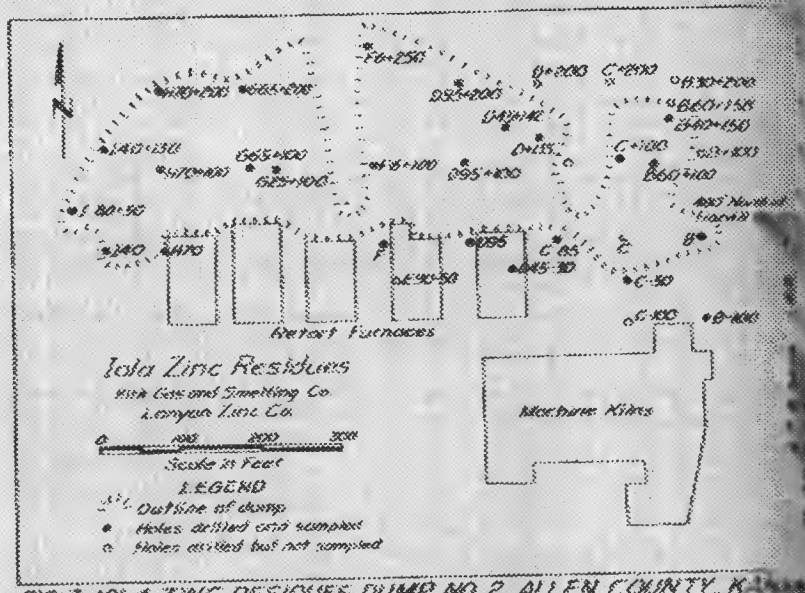
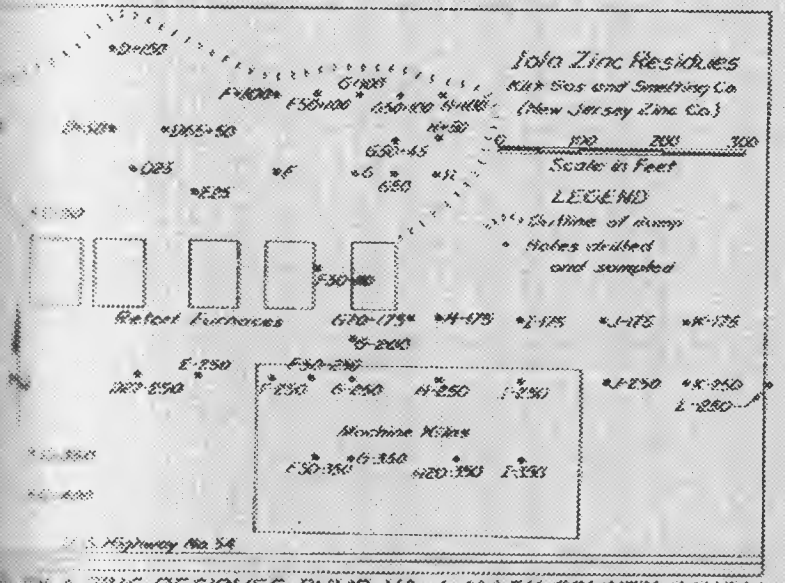


FIG. 3-IOLA ZINC RESIDUES DUMP NO. 2, ALLEN COUNTY, KA



A ZINC RESIDUES DUMP NO. 4, ALLEN COUNTY, KANSAS

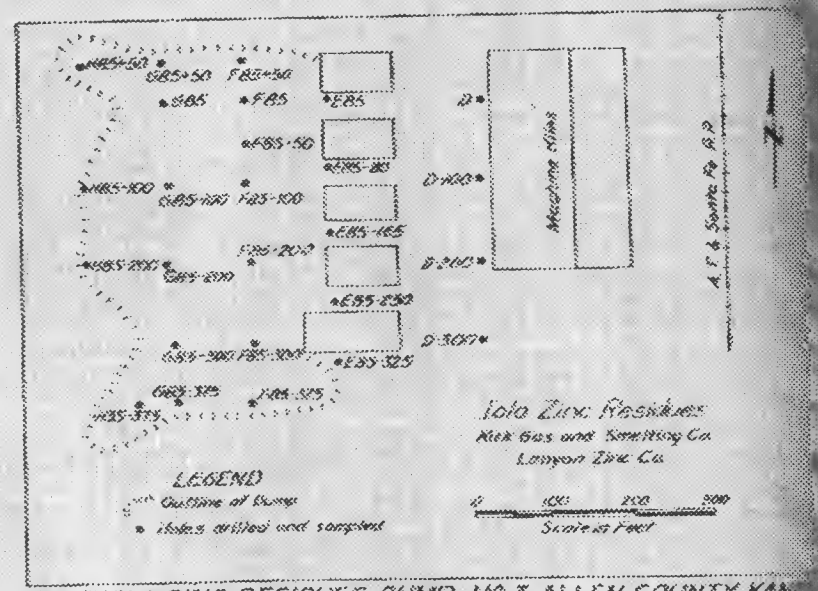
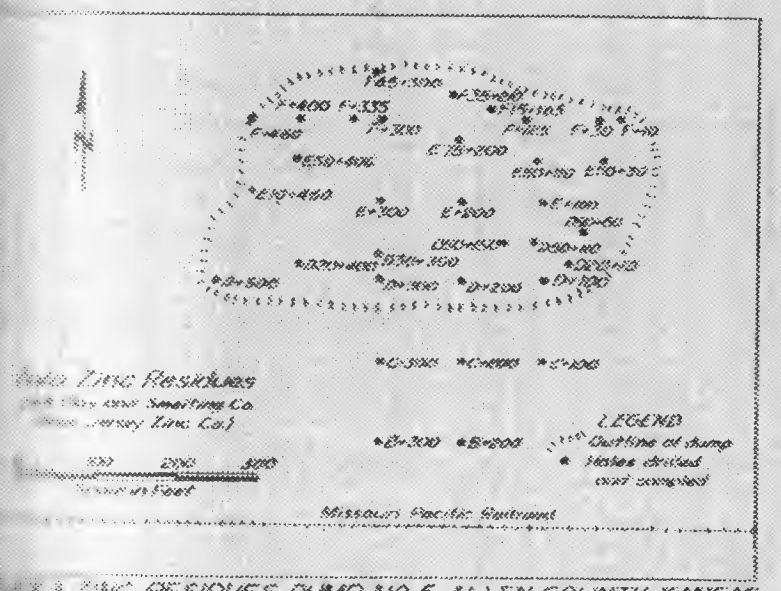


FIG. 4-IOLA ZINC RESIDUES DUMP NO. 3, ALLEN COUNTY, KAN



A ZINC RESIDUES DUMP NO. 5, ALLEN COUNTY, KANSAS

EPA7-001729

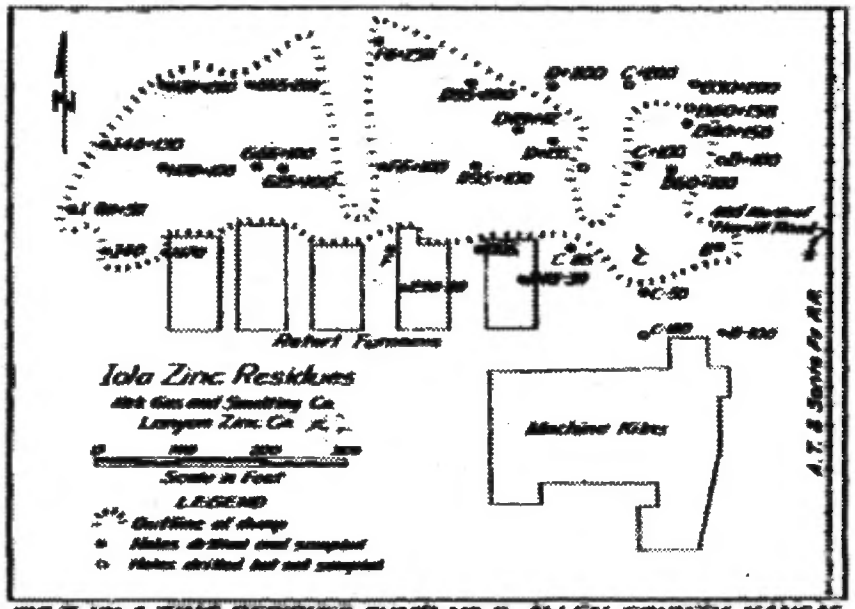


FIG. 3-IOLA ZINC RESIDUES DUMP NO. 2, ALLEN COUNTY, KANSAS

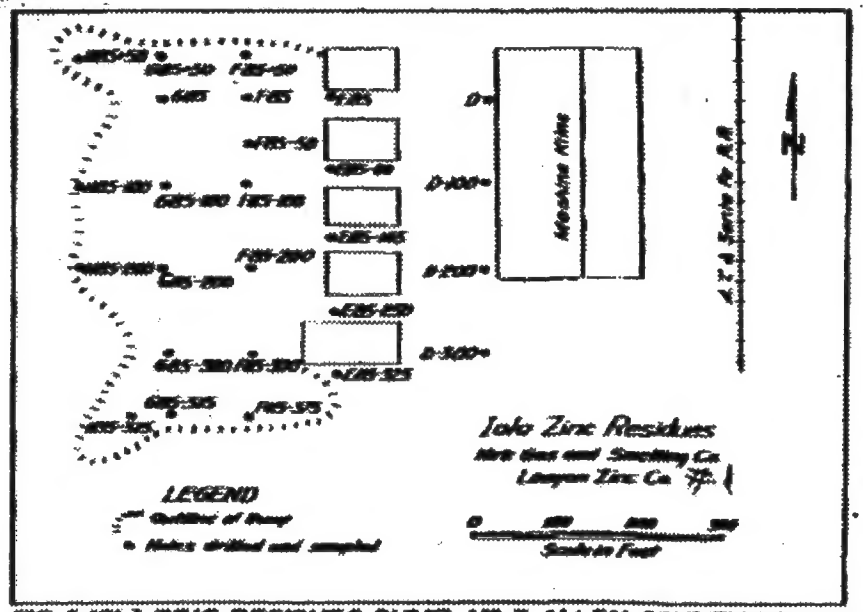


FIG. 4-IOLA ZINC RESIDUES DUMP NO. 3, ALLEN COUNTY, KANSAS

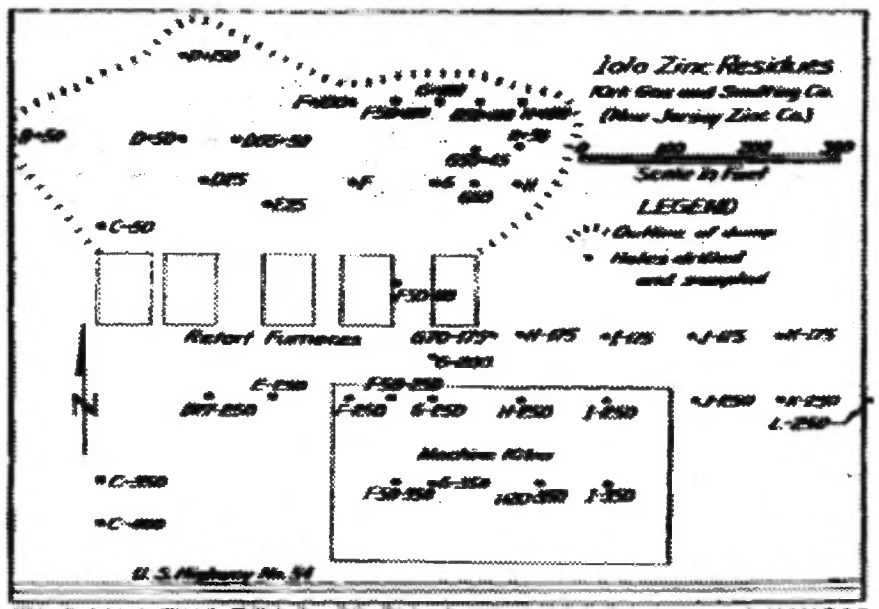


FIG. 5-IOLA ZINC RESIDUES DUMP NO. 4, ALLEN COUNTY, KANSAS

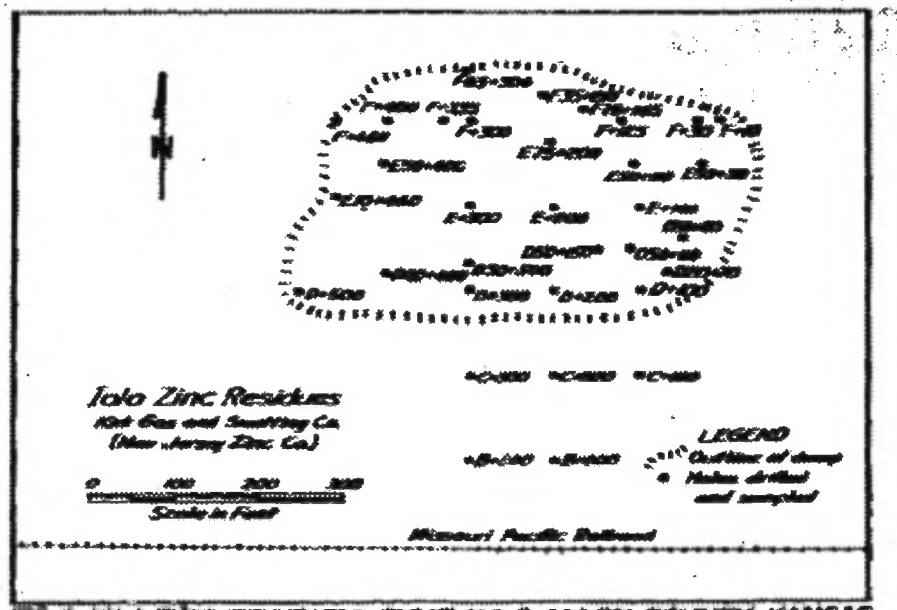


FIG. 6-IOLA ZINC RESIDUES DUMP NO. 5, ALLEN COUNTY, KANSAS

EPA7-001730

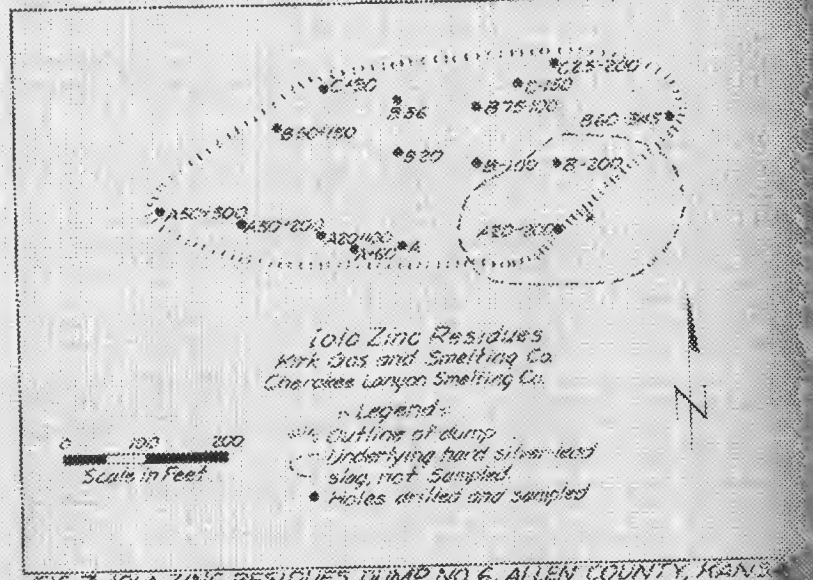


FIG 7, IOLA ZINC RESIDUES, DUMP NO. 6, ALLEN COUNTY, KANS.

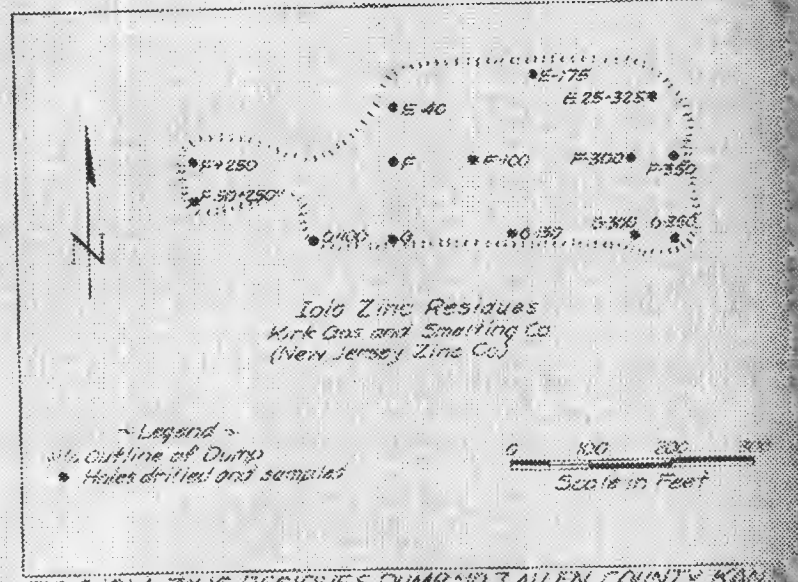


FIG 8, IOLA ZINC RESIDUES, DUMP NO. 7, ALLEN COUNTY, KANS.

TABLE 1. - Summary of Iola zinc residues

Gross tons	Net tons*	Zinc Percent	Zinc Short tons	Carbon Percent	Carbon Short tons
[illegible]	32,279	5.26	1,698	20.57	6,640
[illegible]	10,753	3.19	343	29.12	3,131
[illegible]	6,841	4.74	419	22.98	2,033
[illegible]	14,210	4.27	607	24.98	3,550
[illegible]	15,750	4.25	584	24.67	3,392
[illegible]	7,688	3.23	548	31.42	2,415
[illegible]	9,095	3.56	326	28.18	2,563
[illegible]	96,616	-	4,225	-	23,723
-	-	4.37	-	24.55	-

Gross tons	Net tons*	Ash Percent	Ash Short tons	Volatile Percent	Volatile Tons x percent
[illegible]	32,279	65.51	21,146	13.80	429,310.70
[illegible]	10,753	58.72	6,314	11.56	124,304.62
[illegible]	6,841	65.67	3,805	11.39	106,698.99
[illegible]	14,210	65.58	9,219	9.41	132,710.10
[illegible]	15,750	67.08	9,224	8.24	113,300.00
[illegible]	7,688	58.77	4,518	9.80	75,342.40
[illegible]	9,095	61.90	5,630	9.83	89,312.90
[illegible]	96,616	-	61,956	-	1,065,955.70
-	-	64.13	-	11.03	-

[illegible] percent deduction.

METALLURGICAL TESTS

[illegible] samples from each dump were treated by a simulated [illegible] process. Results indicate that the residues contain enough car- [illegible] addition of carbon to the charge unnecessary. Over 90 percent [illegible] was recovered as a fume.

PLANS FOR COMPANY OPERATIONS

[illegible] J. B. Kirk Gas & Smelting Co. is considering plans to erect a [illegible] with a capacity of 100 tons a day. Two rotary kilns are availa- [illegible] Iola plant of the Lehigh Portland Cement Co. and might serve as [illegible] of a Waelz plant.

[illegible]

[illegible] estimated cost of installation is:

Loading and hauling equipment	$25,000.00
100 ton-a-day Waelz plant complete with crushing and screening plant . . .	175,000.00
	200,000.00
Capital investment per ton (96,616) . . .	$2.07

[illegible] Costs

[illegible] estimated costs of operation, exclusive of interest on the capital [illegible] and royalty payments, are as follows:

EPA7-001731

Loading and hauling	$ 0.50
Preparation of charge	.50
Sorting	.25
Fuel	.10
Power	.25
Insurance and taxes	.10
Lining repairs	.50
Other repairs	.40
Supervision	.35
Labor	.75
Miscellaneous	.10
	3.70
Capital return, without interest	2.07
	5.77

Residue 4.37 percent zinc, 90 percent recovery, 0.0437 x 0.9 x 2,000 = 78.66 pounds zinc a ton. Recovery equals 131.1 pounds of oxide containing 60 percent zinc. Cost of 1 ton of 60-percent zinc oxide $\frac{5.77 \times 2,000}{131.1}$ = $88.02.

These dumps represent a reserve of 4,222 tons of zinc, of which 3,800 tons could be recovered as an oxide by a Waelz plant. Under Metals Reserve Corporation schedules, a R-O quota would be required for their commercial exploitation.

CONCLUSIONS

After examining and sampling the zinc residues in the vicinity of Rolla, the Bureau of Mines concludes that:

1. The dumps contain 96,616 tons of material averaging 4.37 percent zinc and 28.55 percent fixed carbon. About 20,000 tons of material could be recovered from areas around the old smelter foundations. This material is of better grade and averages 5.5 percent zinc. However, it is mixed with broken retorts, concrete, and bricks, and the cost of preparing it would prove too high to justify its use.

2. The zinc residues are suitable for treatment by the Waelz process. Experiments at the Rolla Laboratory of the Bureau of Mines indicate that the material contains enough carbon for the operation, and recoveries of more than 90 percent can be expected.

3. The dumps contain a reserve of 4,222 tons of zinc, of which 3,800 tons could be recovered as zinc oxide in a Waelz plant, but the costs would be relatively high.

oOo

UNITED STATES DEPARTMENT OF THE INTERIOR
Harold L. Ickes, Secretary

BUREAU OF MINES
R. R. Sayers, Director

War Minerals Report 306

TOWNSITE MINE

OTTAWA COUNTY, OKLA.

Supplement to War Minerals Report 26

Zinc, Lead

WASHINGTON

For limited distribution among ... contained therein should not be made ...

EPA7-001732

Loading and hauling	$ 0.50
Preparation of charge	.50
Sorting	.25
Fuel	.10
Power	.25
Insurance and taxes	.10
Lining repairs	.50
Other repairs	.40
Supervision	.25
Labor	.75
Miscellaneous	.10
	3.70
Capital return, without interest	2.07
	5.77

Residue 4.37 percent zinc, 90 percent recovery, 0,0437 x 0.90 x 2,000 = 78.66 pounds zinc a ton. Recovery equals 131.1 pounds of oxide containing 60 percent zinc. Cost of 1 ton of 60-percent zinc oxide is $\frac{5.77 \times 2,000}{131.1} = \$88.02$.

These dumps represent a reserve of 4,222 tons of zinc, of which 3,800 tons could be recovered as an oxide by a Waelz plant. Under present Metals Reserve Corporation schedules, a B-O quota would be required for their commercial exploitation.

CONCLUSIONS

After examining and sampling the zinc residues in the vicinity of Iola, the Bureau of Mines concludes that:

1. The dumps contain 96,616 tons of material averaging 4.37 percent zinc and 24.55 percent fixed carbon. About 20,000 tons of material may be recovered from areas around the old smelter foundations. This material is of better grade and averages 5.5 percent zinc. However, it is mixed with broken retorts, concrete, and bricks, and the cost of preparing it may prove too high to justify its use.

2. The zinc residues are suitable for treatment by the Waelz process. Experiments at the Rolla Laboratory of the Bureau of Mines indicate that the material contains enough carbon for the operation, and recovery of more than 90 percent can be expected.

3. The dumps contain a reserve of 4,222 tons of zinc, of which 3,800 tons could be recovered as zinc oxide in a Waelz plant, but the costs would be relatively high.

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EPA7-001733

DOCUMENT INFO

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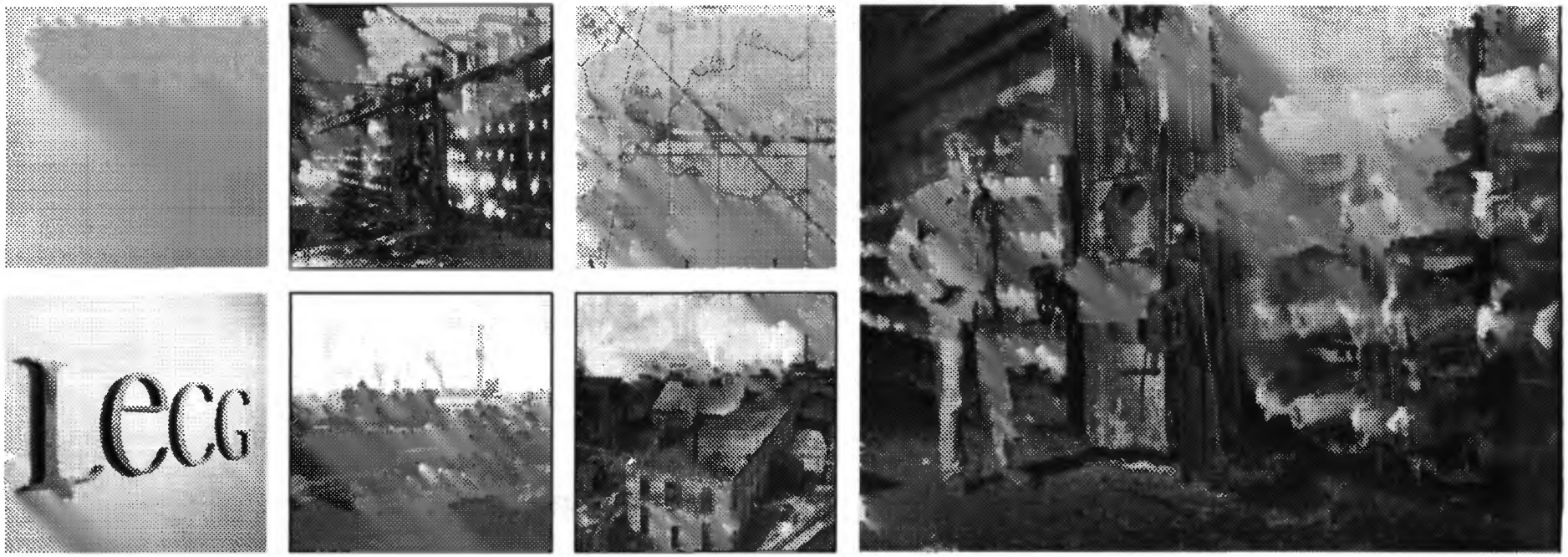
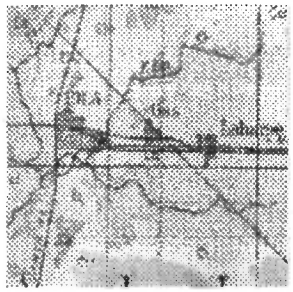
Filename: 052609 Kansas Smelter Presentation.pdf

DOCUMENT INFO



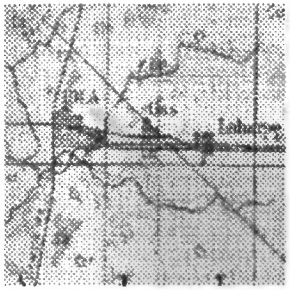
Presentation to U.S. EPA Region 7 on Allen County, Kansas, Zinc Smelters

May 26, 2009



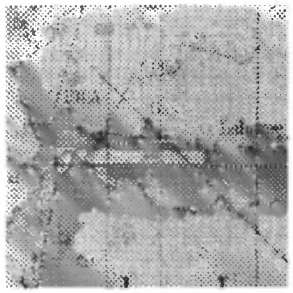
Presentation Agenda

- ✓ Background Information
  - Research Conducted
  - Companies Researched
- ✓ Smelter Site Locations
- ✓ PRP Discussion
  - Operational summary for viable PRPs
  - Corporate history for viable PRPs
- ✓ Preliminary Allocation Analysis



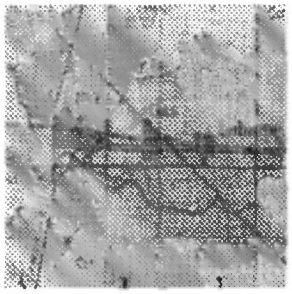
Background Information

1907 Bartlesville, OK, courtesy of KSHS



Background Information

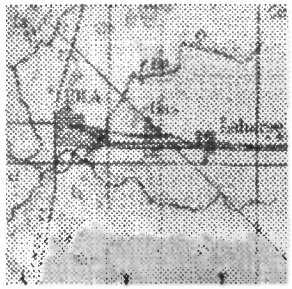
- ✓ LECG was retained by Cyprus AMAX to:
  - Research the operational history of the smelters in Allen County, Kansas.
  - Research the owners and operators of the smelters.
  - Determine if any past smelter owners or operators are currently viable.
  - Research any other historic or current industries in the vicinity of the smelters that may have emitted any of the contaminants of concern, namely, arsenic, cadmium, lead or zinc. "Alternate Sources"



Smelter Companies Researched

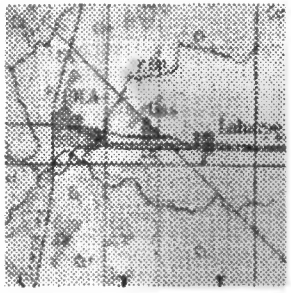
- A. B. Cockerill Zinc
- American Metal Company*
- American Zinc, Lead & Smelting*
- Braun Smelting Company
- Cherokee-Lanyon Spelter Co
- Cockerill Zinc Company
- Iola Zinc Company
- J. B. Kirk Gas & Smelting Co
- Kansas Zinc Company
- La Harpe Spelter Company
- La Harpe Smelting Company
- Lanyon Brothers Spelter Co
- Lanyon Smelting Company
- Lanyon Zinc Company
- L. T. McRae
- New Jersey Zinc Company*
- Nicholson, George E.
- Palmer Smelting Company
- Prime Western Spelter Company*
- Robert Lanyon's Sons Spelter Co
- Standard Acid Company
- United States Smelting Company*
- United States Smelting, Refining and Mining Company*
- United Zinc & Chemical Company
- W. & J. Lanyon

* Viable

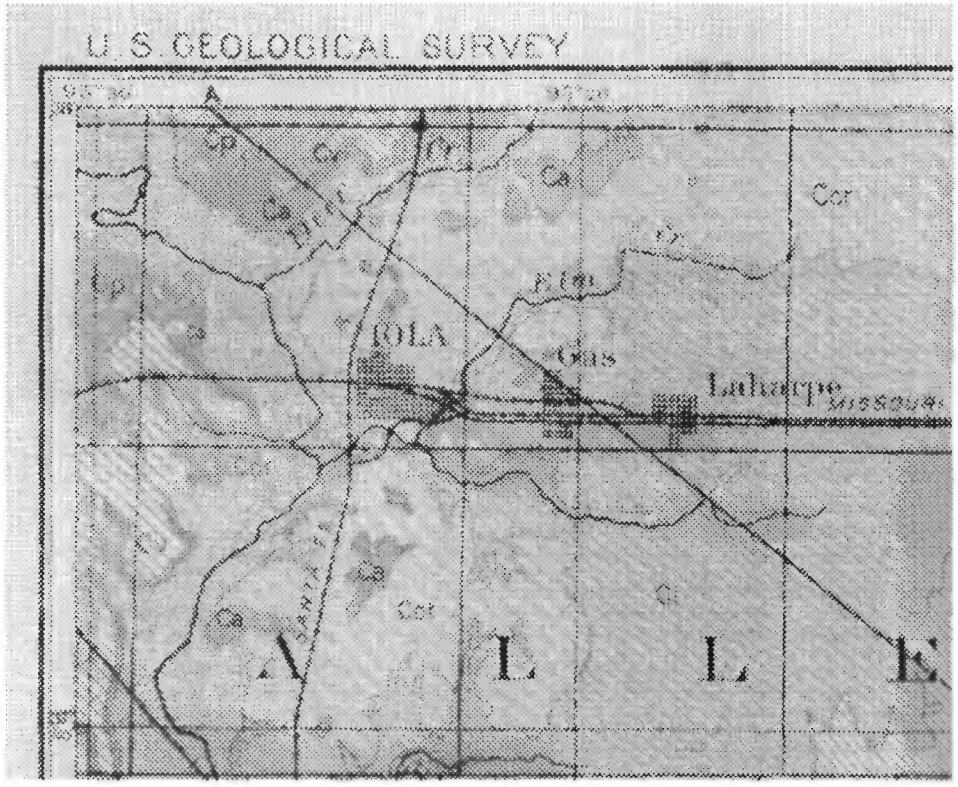


Alternate Source Companies Researched

- Iola Brick Company
- Iola Manufacturing Company
- Iola Portland Cement Company
- Iola Steam Bottling Works
- Kansas Buff Brick & Manufacturing Company
- La Harpe Shale & Brick Company
- Lehigh Portland Cement Co
- Pittsburg Foundry and Machine
- Star Brick Company
- Union Brick Company
- United Clay Products Corp
- United Iron Works

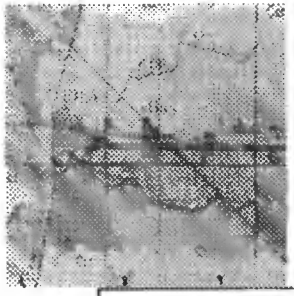


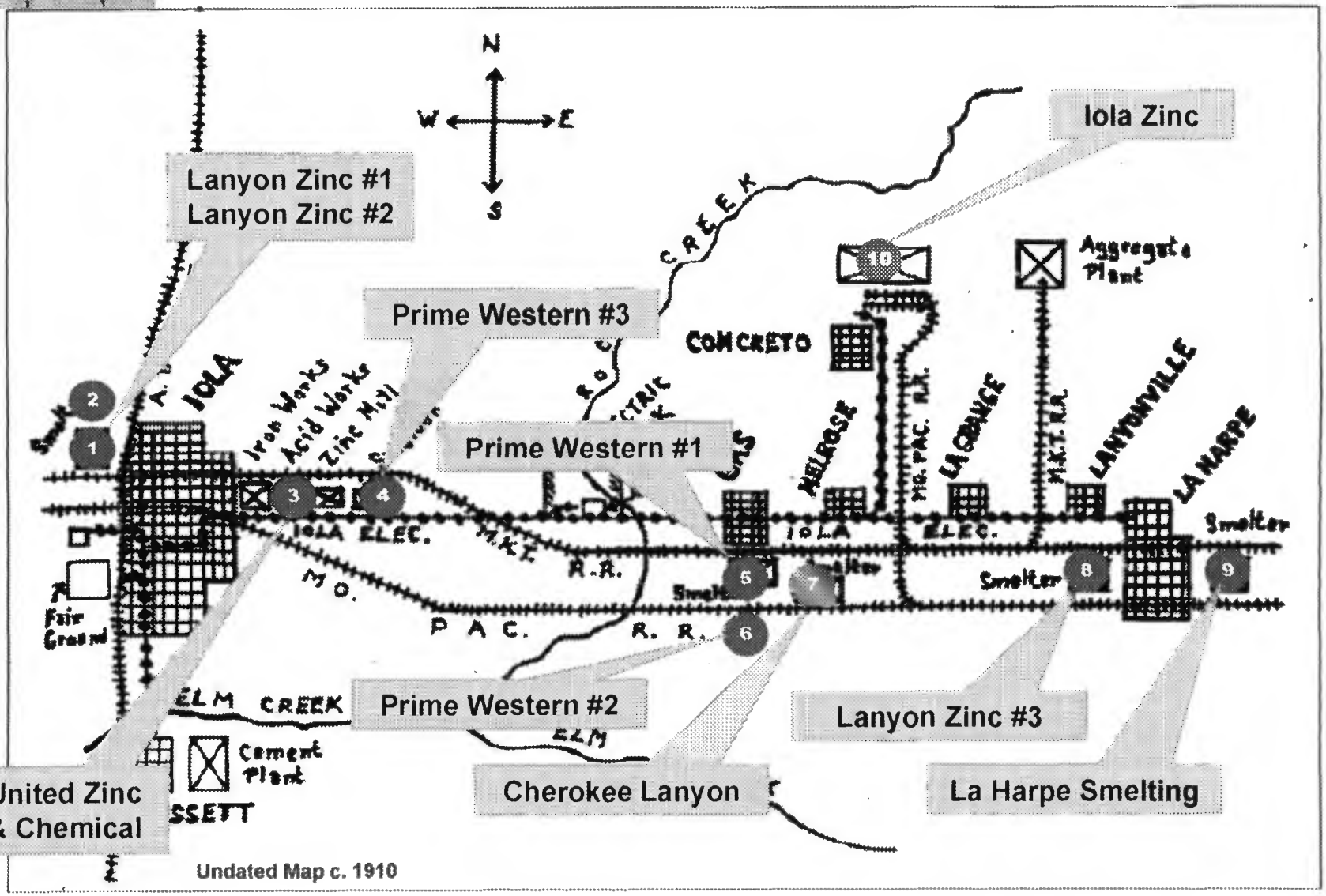
Smelter Site Locations



1904 U.S.G.S. Bulletin No. 238, "Economic Geology of the Iola Quadrangle."

Smelter Sites – Allen County





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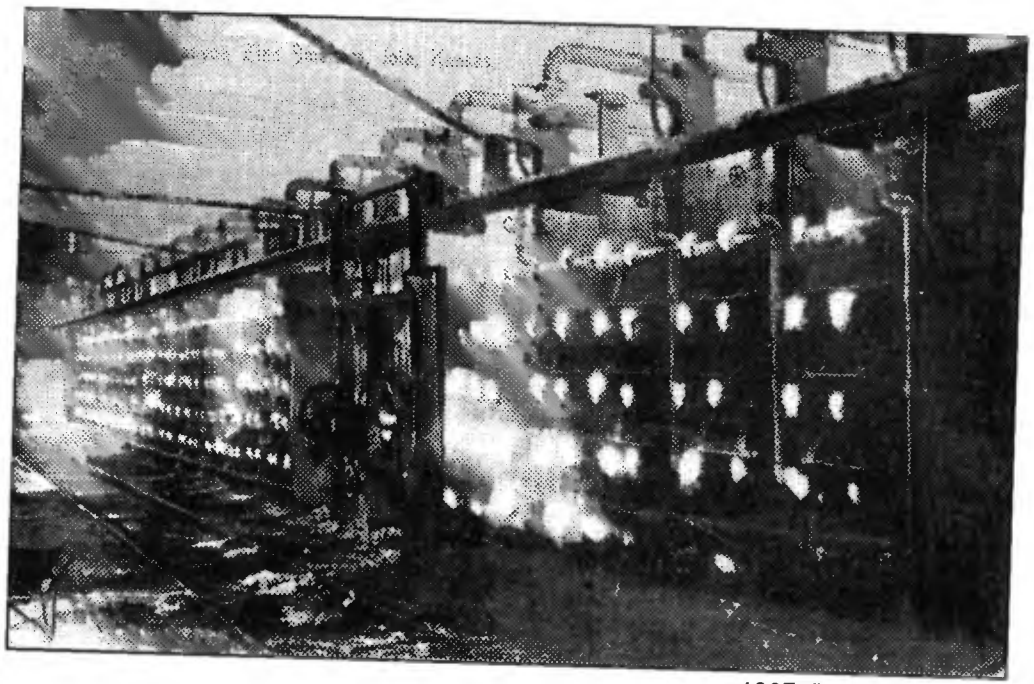
PRP Discussion

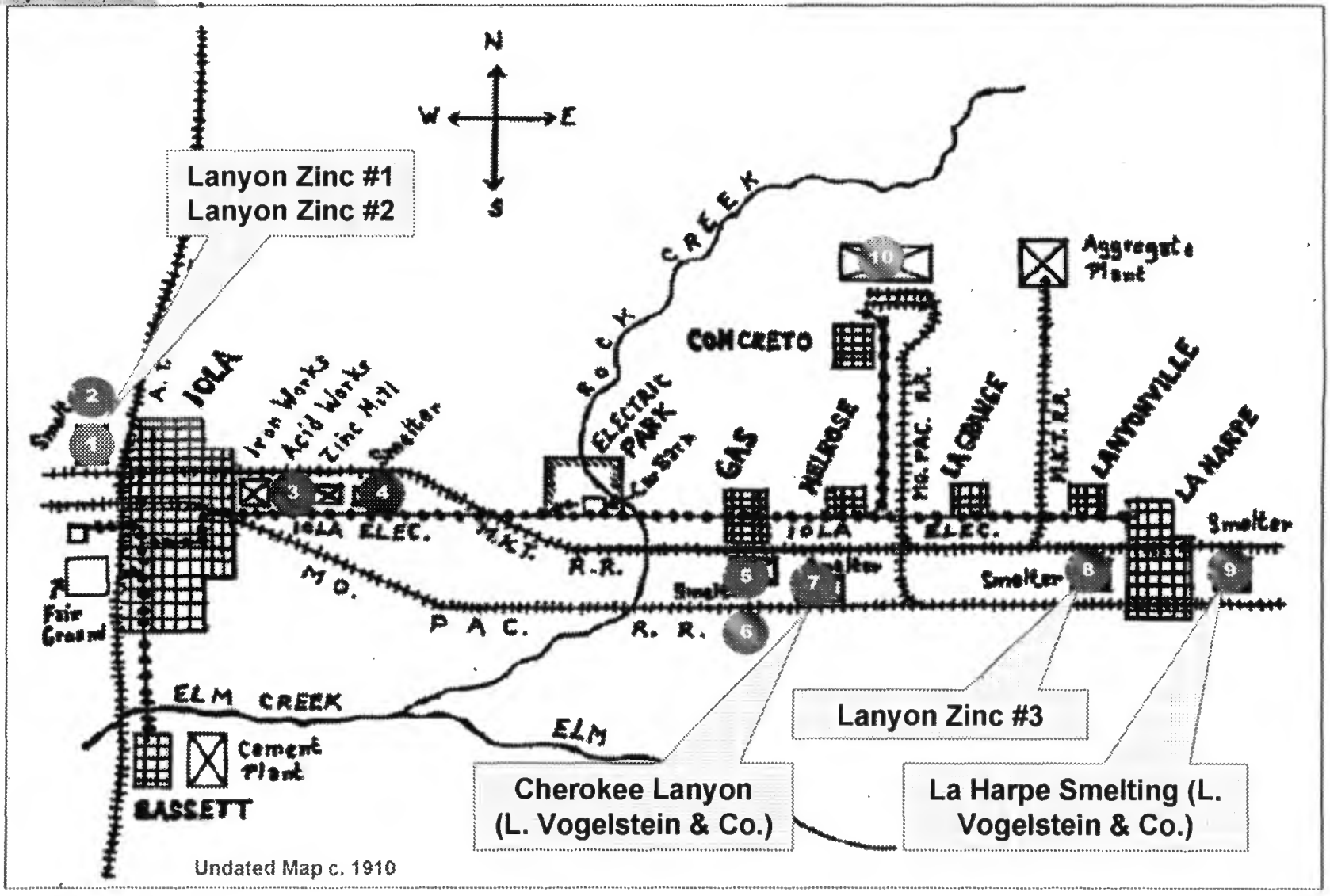


c.1907, Private Collection

American Metal Company, Ltd.

c. 1910, Courtesy of KDHE, "Short History of Zinc Smelting in Kansas"

Smelters Operated by American Metal



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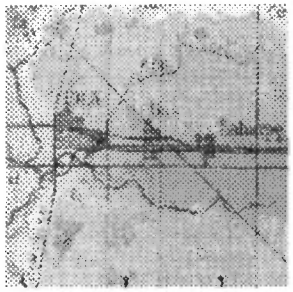
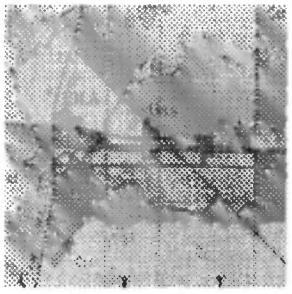


American Metal Company

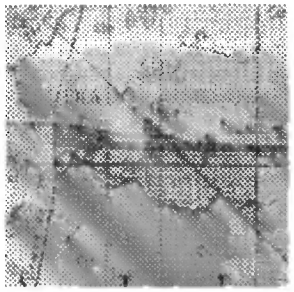
- ✓ **1910** – Operated the three Lanyon Zinc smelters under a lease agreement.
  - The lease had a term of six months.
  - September 7, 1910 - a fire damaged the Lanyon #3 smelter in La Harpe *"now operated by American Metal Company."* Receiver J.B. Kirk and smelter officials inspected the debris to determine the damage.
  - December 26, 1910 - All three Lanyon Zinc works were closed and *"the American Metal Company has surrendered its lease of them."*



American Metal Company (cont'd)

L. Vogelstein & Company

- ✓ 1910-1911
  - Kansas Zinc Company (a company formed by the creditors of the defunct Cockerill Zinc Company) leased two smelters to L. Vogelstein & Company for the period 1910 - 1911.
  - L. Vogelstein & Company did not own, but only operated the:
    - Former Cherokee Lanyon Smelter in Gas City
    - Former La Harpe Smelter in East La Harpe
- ✓ 1920
  - American Metal Company, Ltd. acquired L. Vogelstein & Company in 1920.



American Metal Company (cont'd)

American Metal Co., Ltd.
New York 1887

Acquired

L. Vogelstein & Co., Inc.
Acquired in 1920

Merger with Exchange of Stock

Climax Molybdenum Co.
December 1957

Name Change

American Metal Climax, Inc.
Name Change
Merger December 1957

Name Change

AMAX, Inc
Name Change
July 1974

Merger with Exchange of Stock

Cyprus Minerals Company
Formed in 1969 as a subsidiary of Amoco Corporation

Cyprus Amax Minerals Company
Formed by Merger with AMAX in 1993

Cyprus Amax Minerals Company
Merger with Phelps Dodge
November 1999

Merger with Exchange of Stock

Phelps Dodge Corporation
Formed in 1834

Phelps Dodge Corporation
Merger with Cyprus Amax
November 1999

Phelps Dodge Corporation
Merger with Freeport McMoRan
March 2007

Cyprus AMAX Minerals Company
Merger with Phelps Dodge
November 1999

Merger With Exchange of Stock

Freeport McMoRan Copper & Gold Inc.

Freeport McMoRan Corporation

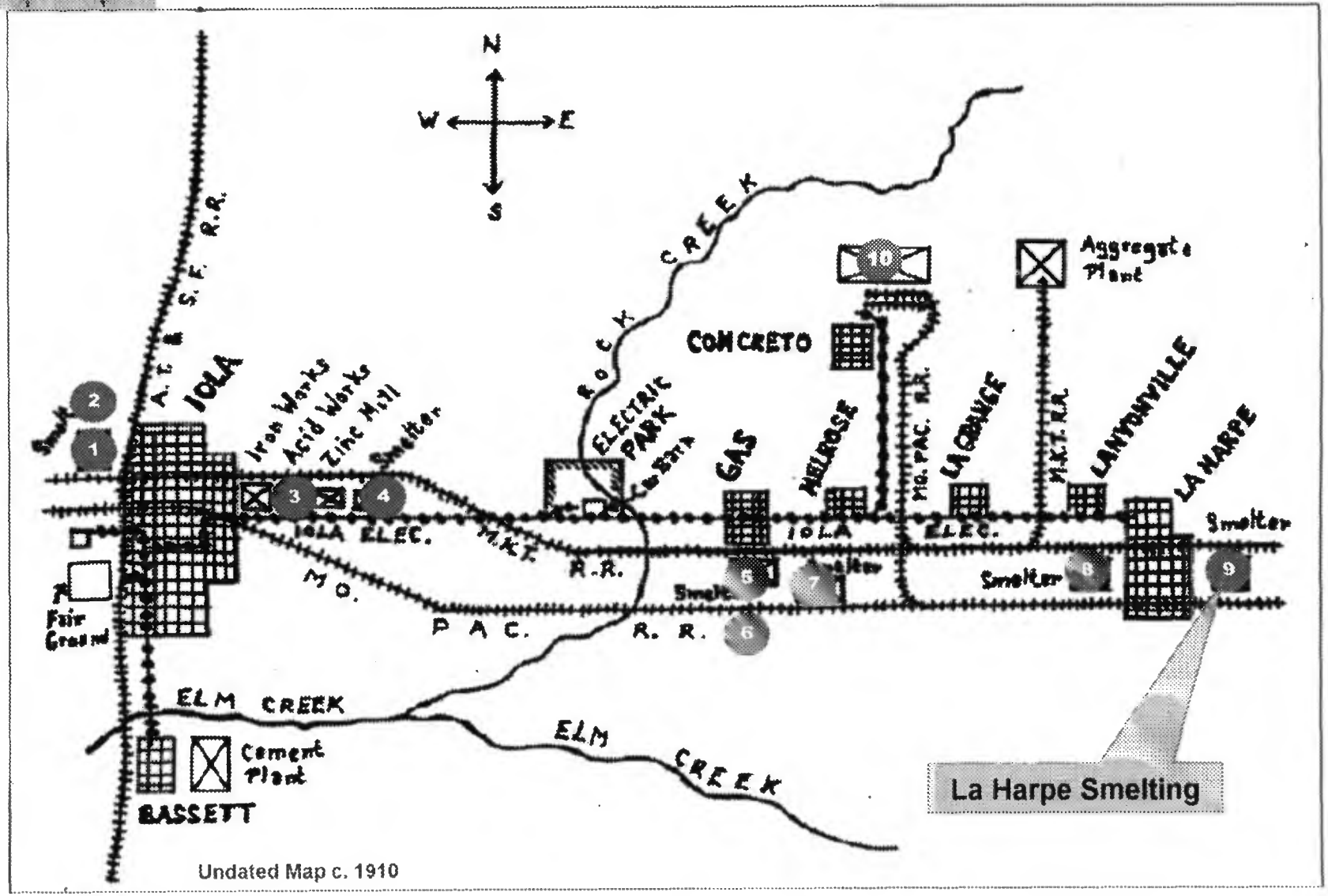
Cyprus AMAX Minerals Company

EPA7-001747

American Zinc, Lead & Smelting Company

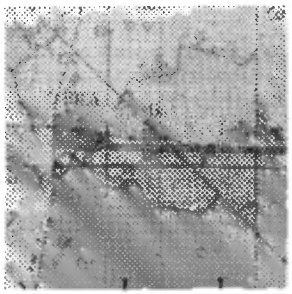
Worker drawing off molten metal from a retort furnace, n.d.,
courtesy of *A History of the American Zinc Company*

Smelter Owned and Operated by AZLS



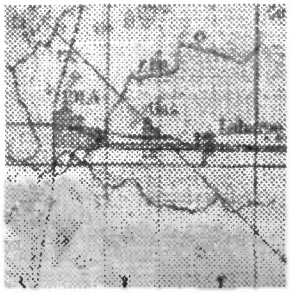
Undated Map c. 1910

EPA7-001749



American Zinc, Lead & Smelting Co.

- ✓ **April 1903** - Purchased the Braun Smelter in East La Harpe constructed in 1902 with 1800 retorts.
- ✓ **December 30, 1905** – Smelter operations ceased and smelter put up for sale.
- ✓ **1906** - The La Harpe Smelting Company (of Wyoming) acquired the smelter.



American Zinc, Lead & Smelting Co.

American Zinc, Lead & Smelting Company
Maine 1899

Name Change

American Zinc Co.
Name Change December 1966

Name Change

Azcon Corporation
Name Change November 1972

Name Change

Gold Fields American Industries, Inc.
Name Change June 1983

Merger

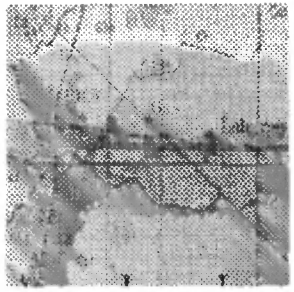
Blue Tee Acquisition Corporation
Merger with Gold Fields February 1986

Surviving Corporation

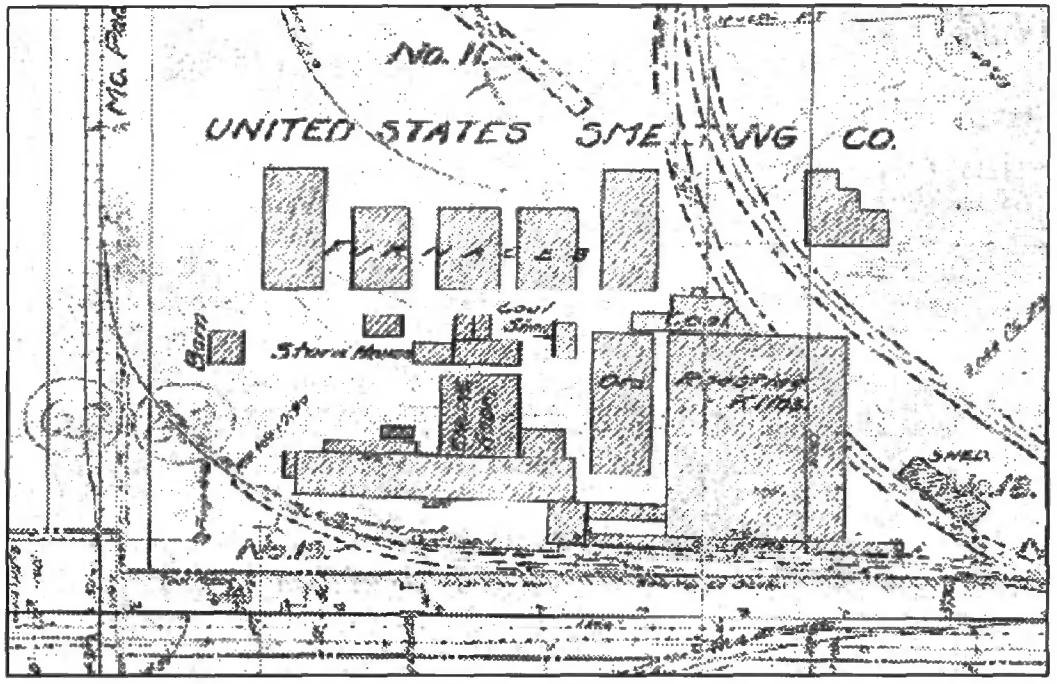
Gold Fields American industries, Inc.
Survivor of Merger

Name Change

Blue Tee Corporation

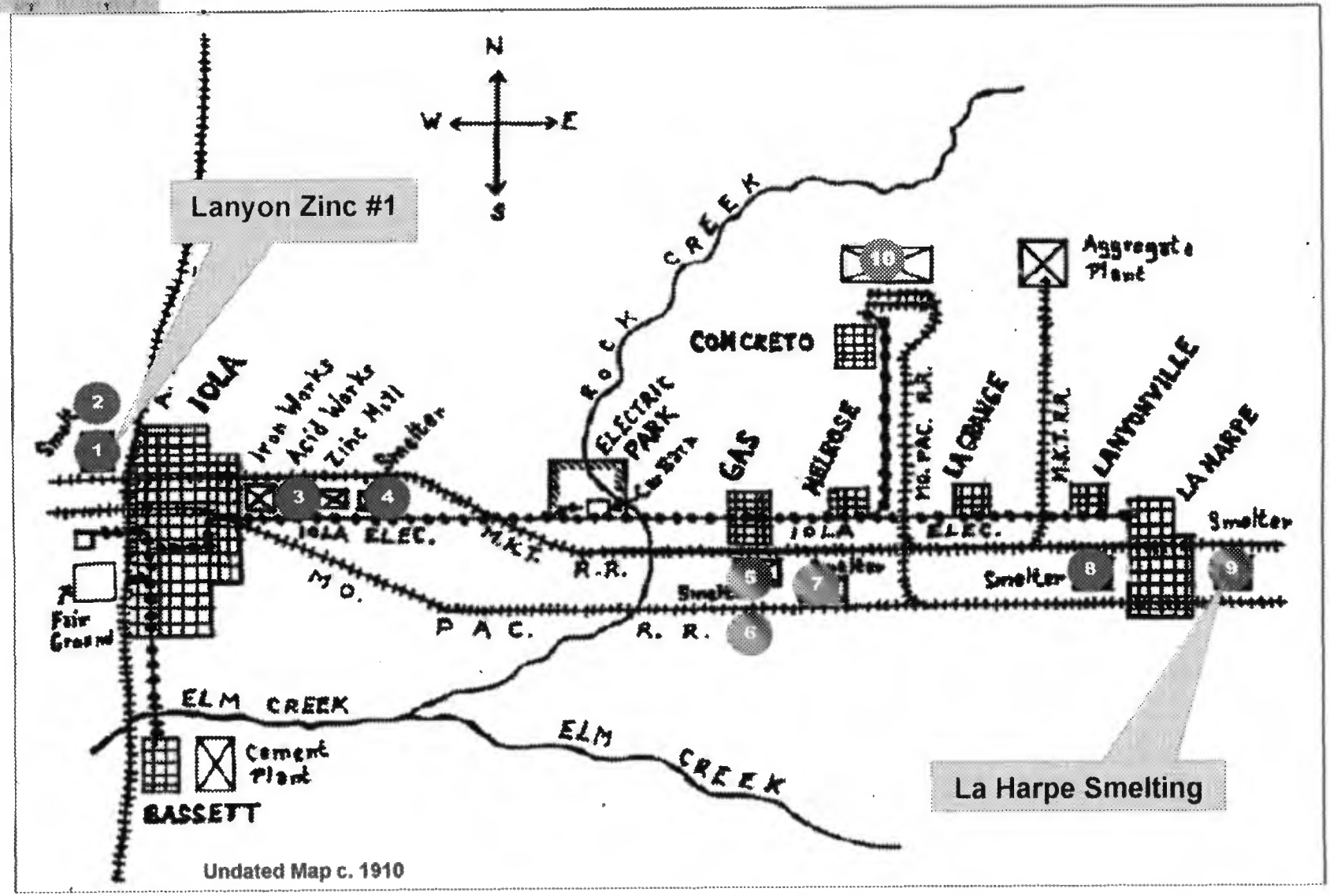


United States Smelting Company



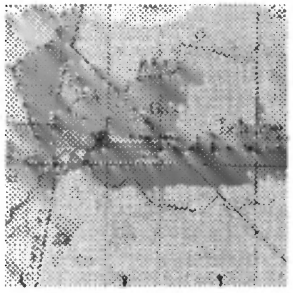
1918 ICC Railroad Valuation Map, Iola, Kansas

Smelter Owned and Operated by US Smelting



Undated Map c. 1910

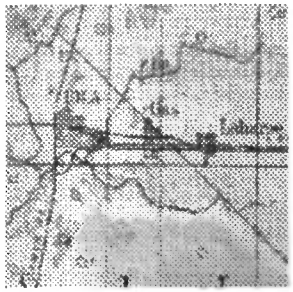
EPA7-001753



United States Smelting Company

1914-1917 – United States Smelting purchased and operated 2 smelters during this period

- ✓ Site 1 - Lanyon Zinc #1 – from July 1914 thru 1916 (rebuilt by J.B. Kirk)
- ✓ Site 9 – La Harpe Smelter – from 1915 thru 1917 (rebuilt by Nicholson Construction)
- ✓ United States Smelting purchased these smelters in 1915, *"in order to dispose of ore production of its own."*



United States Smelting Company (cont'd.)

United States Smelting Refining & Mining Company
Maine 1906

Wholly-owned Subsidiary

United States Smelting Company
Maine 1902

Merger with Exchange of Stock

Mueller Brass Company
Merger
September 1965

Name Change

United States Smelting Refining & Mining Company
Name Change
Merger September 1965

Name Change

UV Industries, Inc.
Name Change
June 1972

In March 1979 stockholders approved a sale of UV Industries' assets and complete liquidation of company.

In November 1979 Sharon Steel entered into an agreement to acquire the assets of UV Industries.

Sharon Steel
Acquired UV Industries Assets and Liabilities
November 1979

In October 1986 US EPA notified Sharon Steel that it may be a PRP for wastes released by UV Industries in Cherokee County, Kansas

Sharon Steel
Controlled by NVF Company after March 1969 acquisition Of 86% of Sharon stock

Chapter 11 Bankruptcy

Sharon Steel
Filed for Chapter 11
April 1987

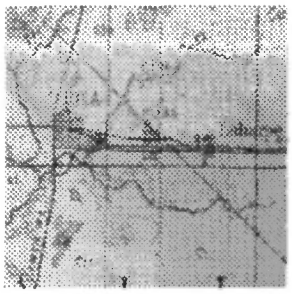
Unsecured creditors, the largest being Quantum, pay $50 million for 30% of reorganized company to be called Mueller Industries.

Mueller Industries, Inc.
Created to acquire Former Mueller Brass as Part of Reorganization Plan
November 1990

Mueller Industries, Inc. is a successor of Sharon Steel

Prime Western Spelter Company

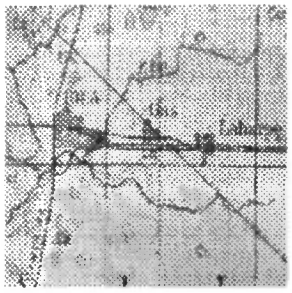
1907 Prime Western Works #1, courtesy of Wichita State University



Prime Western Spelter Company

✓ 1898 – 1901

- Prime Western Spelter Company incorporated in Missouri in August, 1898; and had the following officers and directors through at least April 1901:
  - J.A. Daly, President
  - W.L. Callaway, Secretary
  - L. T. McRae, Director
  - G.R. Godfrey, Director
  - L.H. Callaway, Director
- Also in 1898, Prime Western Spelter Company built a smelter at Gas City, Kansas (Prime Western #1)

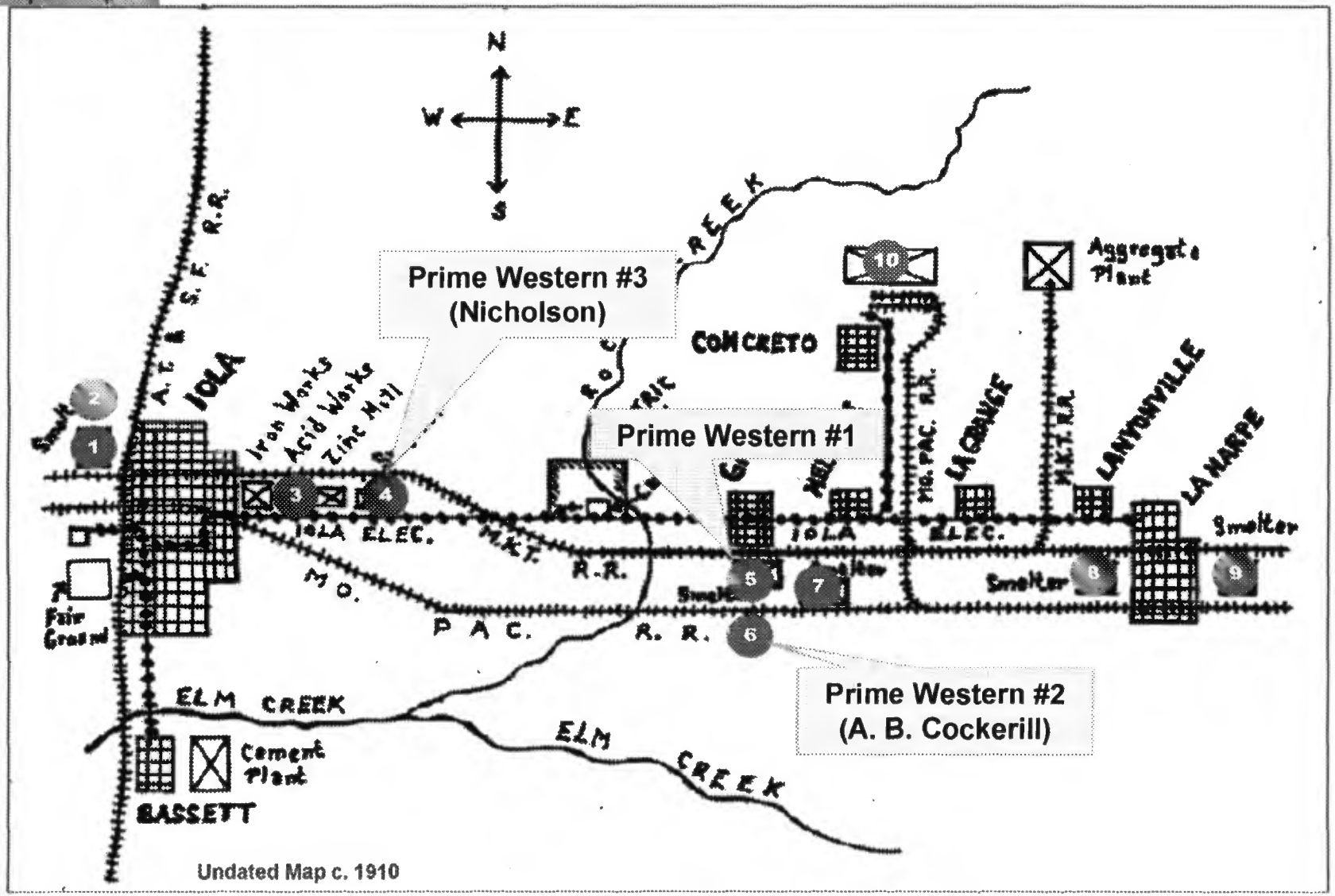


Prime Western Spelter Company (cont'd)

✓ 1902

- In April and May 1902, **Mark T. Cox**, who it appears later became a director of the New Jersey Zinc Company, negotiated the purchase of the Prime Western #1, and an adjoining smelter built by Almond B. Cockerill in 1901. These smelters were later known as Prime Western Works #1 and #2, respectively. The *New York Times* stated that the New Jersey Zinc syndicate had been trying for some time to get options on these smelters.
- When the deal closed, **A. P. Cobb,** secretary, and **Henry Wardner**, treasurer, of New Jersey Zinc, were present in Kansas and were interviewed by the local newspaper as representatives of New Jersey Zinc.
- In June the Nicholson smelter (which became known as Prime Western #3 in East Iola) was purchased by Prime Western Spelter Company for New Jersey Zinc.
- The acquisition of the three smelters by New Jersey Zinc was reported in the national mineral industry trade literature.

Prime Western Spelter Company (cont'd)



Undated Map c. 1910

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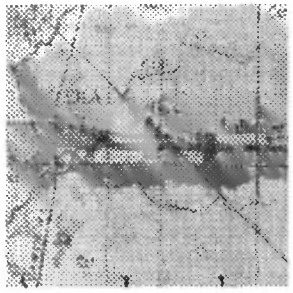


Prime Western Spelter Company (cont'd)

1904

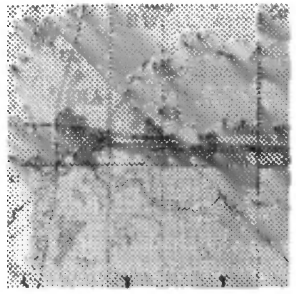
Prime Western Spelter Company (a Missouri corporation) requested authorization to operate as a foreign corporation in Kansas. Its officers were identical with those of New Jersey Zinc Company.

Prime Western Spelter

- President: **S. S. Palmer**
- Vice President: **Wm. P. Hardenburgh**
- Treasurer: **Henry G. Wardner**
- Secretary: **A. P. Cobb**
- General Manager: **L. T. McRae**
- Director: **August Heckscher**
- Director: **A. E. Spencer**
- Director: **Daniel Dwyer**
- Director: **H. B. Borice**

New Jersey Zinc

- President: **Stephen S. Palmer**
- Vice President: **Wm. P. Hardenburgh**
- Treasurer: **Henry G. Wardner**
- Secretary: **A. P. Cobb**
- Director: **Wm. P. Hardenburgh**
- Director: **August Heckscher**
- Director: **D. B. Jones**
- Director: **Edwin M. Squier**
- Director: **M. Taylor Pyne**



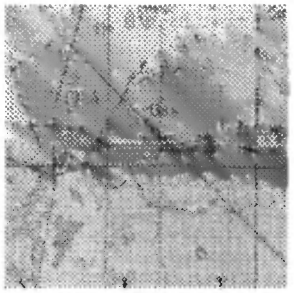
Prime Western Spelter Company (cont'd)

- ✓ **1905**
  - Installed a recuperative smelting furnace at the Gas City works that was developed at Palmerton and patented by New Jersey Zinc Company. [712502]
- ✓ **1909**
  - New Jersey Zinc submitted a brief on imported zinc ore tariffs to the U.S. House Committee on Ways and Means. In this brief New Jersey Zinc indicates that it was:

    "Representing five zinc smelting plants in the Middle West which have experienced a shortage in the domestic ore supply…"

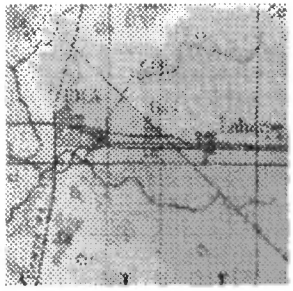
    The 5 Middle West smelters were:

    - Prime Western Spelter Company – 3 plants
    - Mineral Point Zinc Company, DePue, IL – 1 plant
    - Empire Zinc, Joplin, MO – 1 plant



Prime Western Spelter Company (cont'd)

- ✓ **1909**
  - Prime Western was represented at an Allen County Commissioners meeting by **C. A. H. de Saulles**, assistant general manager of the Gas City smelters.
- ✓ **1911**
  - **C. A. H. de Saulles** of Gas, Kansas, applied for a patent for improvements to zinc retort furnaces. The patent was assigned to New Jersey Zinc Company. [1041977]
- ✓ **1911**
  - Prime Western #2 in Gas City was dismantled and was moved to Collinsville, Oklahoma where it became the nucleus of the Tulsa Fuel & Manufacturing smelter.



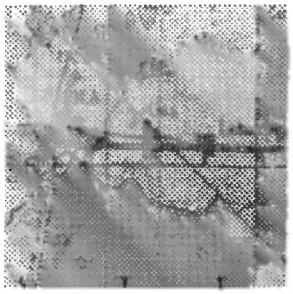
Prime Western Spelter Company (cont'd)

✓ 1918

- February 28, A tornado severely damaged the smelters in Gas and Iola. New Jersey Zinc representatives arrived on March 1 to survey the damages, as reported in the local paper:

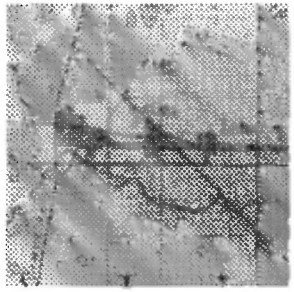
  "The Prime Western officials in the local offices were unable to make any statement this morning whether or not the furnace sheds would be rebuilt. One of the officers from the general office in Chicago arrived in Iola today. It is understood that they are awaiting the official sanction of the New York offices of the New Jersey Zinc Company, of which the local company is a subsidiary, before beginning work."

- By April the repairs to Works #3 were completed and the smelter was operating. J.D. James, from the Palmerton Plant of New Jersey Zinc was *"superintending the operation of the new refinery during its early stages."*

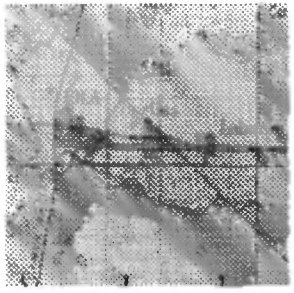


Prime Western Spelter Company (cont'd)

- ✓ **1920**
  - November – Prime Western #3 smelter in Iola was sold to J.B. Kirk, and no further slab zinc production is documented.
- ✓ **1922**
  - December – Prime Western Spelter Company withdrew from doing business in Kansas – A. P. Cobb and A.B. Schultz signed as Vice President and Secretary of Prime Western. Both men held the same offices within New Jersey Zinc.
- ✓ **1924**
  - June – Prime Western Spelter Company dissolved in Missouri. Edgar Palmer was President of Prime Western and New Jersey Zinc.



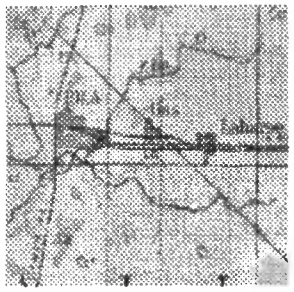
Corporate Relationship of Prime Western Spelter Company to New Jersey Zinc Company



NJZ Corporate Relationships

Corporate History Methodology

- ✓ Use primary sources
  - Corporate documents and records (Annual reports, correspondence, financial records)
  - Secretary of State filings
  - SEC corporate filings
    - SEC not established until 1933 the operating period of the smelters was too early to appear in the SEC records
- ✓ Use reliable secondary sources
  - Corporate publications (i.e., *Zinc* magazine)
  - Industry Trade Literature
  - Financial Trade Literature (i.e., *Moody's, New York Times*)



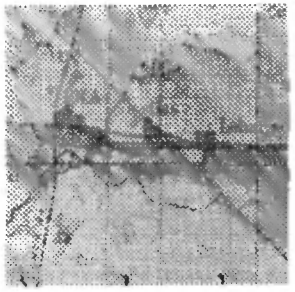
NJZ Corporate Relationships (cont'd)

Plan of Organization of The New Jersey Zinc Company

Zinc, November 1918

The New Jersey Zinc Company is the parent company and its lines of organization and routines carry through all the subsidiaries. The reasons for the existence of those subsidiaries will be found in the various State laws governing corporations. I want to impress upon you that there is no subterfuge here—we are not hiding behind some other name with ulterior motives.

Let me again use an example to illustrate. The laws of Pennsylvania do not permit a corporation, incorporated in another State, to own real estate in Pennsylvania—it is therefore necessary for us to form The New Jersey Zinc Company (of Pa.) in order to own the Palmerton Plants; there is no concealment here, the latter company does not make any money, but turns its product over to the parent company at cost. And so will be found a similar reason wherever we operate under another name than that of The New Jersey Zinc Company.



NJZ Corporate Relationships (cont'd)

Subsidiary Companies

Zinc, July 1919

Properties of the New Jersey Zinc Company

By F. P. Nolan

The general scheme of operation of the New Jersey Zinc Company and its subsidiary companies is somewhat complex and to follow its products from the time they are taken out of the mine until manufactured into commercial products one ought to know in a general way the subsidiary companies and their respective places of operation. These subsidiary companies are:

The New Jersey Zinc Company (of Pa.)
Mineral Point Zinc Company.
The Empire Zinc Company.
Empire Zinc Company (of Mo.)
Prime Western Spelter Company.
The Tusla Fuel and Manufacturing Company.
The Bertha Mineral Company.
Hyatt Ore Corporation.

The companies conduct operations at the following places:

The New Jersey Zinc Company (which may properly be called the parent Company) at Franklin and Ogdensburg, New Jersey.

The New Jersey Zinc Company (of Pa.) at Palmerton, Freemansburg and Allentown, all in the State of Pennsylvania.

Mineral Point Zinc Company at Mineral Point, Wisconsin, Depue and Galena, Illinois and in the Illinois and Wisconsin mining fields.

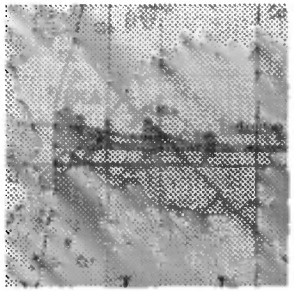
Prime Western Spelter Company at Iola, Kansas and Tiltonville, Ohio.

The Empire Zinc Company at Belden, Canon City, Gilman and Leadville, Colorado; Hanover, Kingston, Silver City, New Mexico; Tuscon, Arizona; and Arden, Nevada.

Empire Zinc Company (of Mo.) at Joplin, Missouri.

Bertha Mineral Company at Kingsland and Cartersville, Georgia, and Austinville, Virginia.

The Tulsa Fuel and Manufacturing Company at Collinsville, Oklahoma.

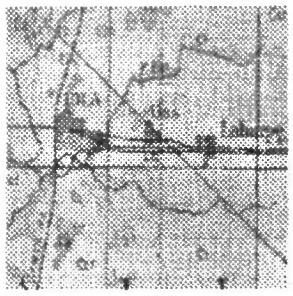


NJZ Corporate Relationships (cont'd)

Interactions with subsidiaries

Zinc, July 1919

> The purpose of this article is to very generally outline the location and product of the various plants and mines of the New Jersey Zinc Company and its subsidiary companies and for use in connection with the map showing the various properties of the Company. To detail the various steps necessary to turn out a commercial product and to point out the complicated interrelation of the plants and mines would make a long story; suffice it to say that the operations of the parent Company and those of its subsidiaries are so interwoven that they are to a large extent inter-dependent.



NJZ Corporate Relationships (cont'd)

Examples of Corporate Interaction at the Facility Level:

✓ **Inspections**

Facilities were inspected by corporate officers and managers.

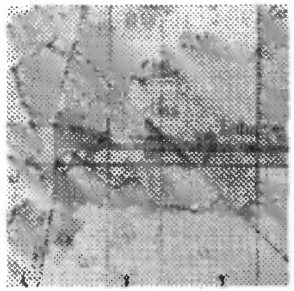
Zinc, April 1916

> J. E. HAYES, JR. vice-president and general manager, and A. D. TERRELL, general manager Mineral Point Zinc Company, recently inspected the plants at Iola, Kansas and Collinsville, Oklahoma. They were also in consultation with H. B. Talley, counsel, at Tulsa, Oklahoma.

Inspections by corporate staff were not uncommon.

Zinc, January 1918

> IOLA
>
> H. G. Hixon was in Iola December 5 looking over the plants. He left for Collinsville the following day.



NJZ Corporate Relationships (cont'd)

Examples of Corporate Interaction at the Facility Level:

Supervision of Operations
Iola refinery operations

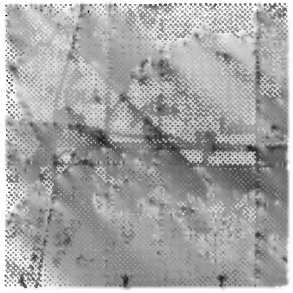
Zinc, May 1918

> H. G. Hixon, of Chicago, and J. D. James, of Palmerton, arrived in Iola April 11th. Mr. James is superintending the operation of the new refinery during its early stages.

Corporate office in Chicago managed the maintenance, operation and production of the smelters

Zinc, July 1919

> The general office of this Company at Chicago supervises the maintenance and coordination of the plants for adjustment of their output according to the ores available from the mines and according to the orders that must be filled. The mining of ore, however, is supervised by the Galena office.



NJZ Corporate Relationships (cont'd)

Facility Maintenance and Operations Management

Zinc, June 1917

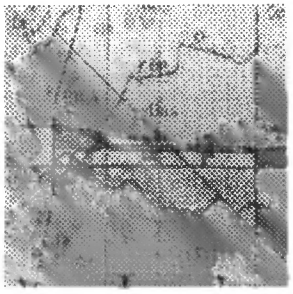
Iola Makes an Endurance Record

An item published in the *Engineering and Mining Journal* for March 31, 1917, comments at length at the record made by block C, of 600 retorts, on the Cherryvale works of the Edgar Zinc Co. which was put in full charge March 12, 1907, and has been in operation ever since, except in being in dead-fire for 30 days at various periods. The *Journal* says that this record is "phenomenal and surpasses anything else whereof we know." Through the courtesy of Mr. Hixon we are enabled to publish the following records made by two blocks at Iola. It will be noticed that block No. 4 surpassed the Cherryvale record by a year, and that Block No. 1 has surpassed it by three years and is still in operation. The *Journal* confers great credit on the manager of the Cherryvale plant, and it is evident therefore that Mr. Hixon is entitled to a *magna cum laude*.

RECORD OF CONTINUOUS OPERATION BLOCKS NO. 1 AND 3, PLANT NO. 3, PRIME WESTERN SPELTER CO., IOLA, KANSAS.

Block	Period of Operation	Ore Charged lb.	Zinc %	Zinc Content lb.	Metal Made, lb.	Rec'y %	Yield %
1	Oct. 6, 1904 to April, 1917	153,705,636	37.08	56,996,462	47,889,197	84.02	31.16
4	June 12, 1904 to July 1, 1915...	123,571,528	37.99	46,938,719	39,339,443	83.81	31.84

NOTE: During the time mentioned above, Block No. 1 for various reasons was dead-fired twenty-seven days. Block No. 4 forty-six days. Block No. 1 is still in operation.



NJZ Corporate Relationships (cont'd)

Ore Procurement and Transport

Zinc, February 1919

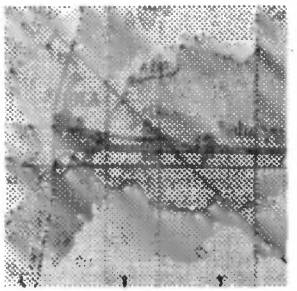
The Activities of The New Jersey Zinc Company in Mexico and Western United States*

The company first became interested in Mexico from an ore-buying standpoint. Oxidized Mexican Zinc ores were first shipped to the Iola plant in 1905 with good results. Our office at Monterey, the capitol of the State of Nuevo Leon, was opened in 1906. tionary periods this office was never closed and is at present purchasing ores for our plants in this country, as well as directing the operations of one of our Mexican mines.

The Mexican mine owners were at first suspicious of American ore buyers.

You may be interested in knowing something about our mining operations in Mexico. Our first property was the LaBufa mine, located in the Charcas district, State of San Luis Potosi, Mexico. The deposit as purchased was a low grade silicate ore, opened up fairly well on the surface. Shipments, assaying about 27% zinc and no lead, were made to the Iola, Palmerton and Mineral Point plants. The grade was low and the freights high. The ex-

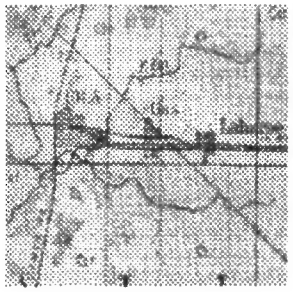
own mines. We are, therefore, mining and buying ores for Palmerton and the other company plants to treat, but after all it is really one big complicated operation of the New Jersey Zinc Company, and being so, hearty and continuous co-operation from the acquirement of the crude ore by mining by purchase to the delivery to the consumer of the finished products made from the ore is, it strikes me, one of the biggest factors involved. To success-



NJZ Corporate Relationships (cont'd)

Corporate Pension Plan

- ✓ 1912
  - Both Prime Western and Tulsa Fuel are included and are contributing proportionally to the corporate pension fund.
- ✓ 1919
  - Both Prime Western and Tulsa Fuel are still included in the New Jersey Zinc corporate pension fund with slightly different percentages of contribution.



Prime Western Spelter Company (cont'd)

Prime Western Spelter Company
Missouri 1898

New Jersey Zinc Company
New Jersey 1880

New Jersey Zinc Company
Acquires PW May 1902
Forms TF&M June 1906

Prime Western Spelter Company
Foreign Corp in Kansas, November 1904

Prime Western Spelter Company
Withdraws from Kansas, December 1922

Prime Western Spelter Company
Dissolves in Missouri, June 1924

Tulsa Fuel & Manufacturing Company
Kansas 1906

Tulsa Fuel & Manufacturing Company
Dissolves in Kansas, December 1926

Gulf & Western Industries
Merged with New Jersey Zinc, February 1966

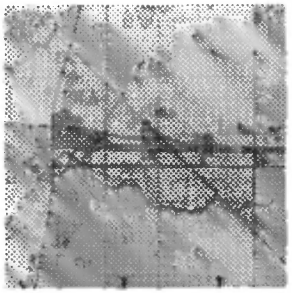
Gulf & Western Inc.
Became Paramount Communications in July 1994

Paramount Communications
Merged with Viacom Sub, Inc July 1994

Viacom, Inc.
Merged Paramount Communications July 1994

Viacom Inc.
Merged with CBS Corp May 2000

CBS Corporation



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Filename: 1908-1910 Quarterly Report.pdf

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Quarterly Report

A supplement to The Register

1908 — 1910

years of

Merry Widow hats,

Portland Cement plants

and automobiles

The annals of lola

editor of *The Quarterly Re-*
[illegible] years of the
history of lola as reported in *The Register*.

The story is set in 1908. Cement plants were under construction at Paxton, Chanute and Humboldt and another would soon be started at Carbon. But the city's leading boosters were fighting mad as a result of the [illegible] of the Santa Fe and a continuing supply of [illegible] to lola.

[illegible] story centered [illegible] bankruptcies that were devastating the other and lola's economy remained strong.

Strong enough so that women would pay $150 for a Merry Widow hat, such as these Gibson Girls model-

ed, when that amounted to a week's wages at the [illegible] plants. Strong enough so that Ray Chesney, [illegible] could [illegible] $500,000 post office and federal office building.

lola welcomed the post office, even though it was only a large construction project in the [illegible] history, and [illegible] a set of pictures were taken at regular intervals as it was being built. Fortunately those pictures were preserved in the post office files. Five of them are reproduced in this issue.

The post office site was purchased with donated funds and given to the government so that the $500,000 appropriated could all be used for the building. When the bids came in at $431,000, Rep. Scott asked that a new design be drawn for "a grander building" to use up the balance of the appropriation. His request was granted.

Public buildings were more private in those days — and so were the dresses that fashionable women wore to the social affairs of the day.

The drawings were only part of the story. For [illegible] listen to one husband's lament:

"Hooking the skirt, a dress in the back can be a pain. The [illegible] hooks and eyes seem easy and a delusion yourself into thinking you have a snap. Your wife suggests trying to help and you start [illegible]

The first "eye" is not to be found. You finally find it and loose the "hook." The second hook splits your nail and you say something which your wife hears in stony silence. Finally you get both eyes and hooks together and stop to mop your brow. Fifteen minutes later and you have seven hooks together. If you ever have enough money you will hire your wife a maid, you can bet on that. By the time you have your wife hooked up you could go out and sell the janitor that delivers ice in bed. A Brooklyn genius has invented a device which carries all the hooks and eyes on a [illegible] hand and in one movement [illegible] hooks up the whole dress."

[illegible] more inside.

EPA7-001777

1908

January

2 — C.H. Wheaton sold his lease to the Grande Theatre to George H. Lynch.

George Thompson, cemetery sexton, reports there are now 4,000 graves within the grounds and they are marked with 1,140 monuments. A list of those who died during the year followed.

3 — The city council accepted the offer of the Prime Western Smelter to furnish the city gas in case of an emergency.

Members of Mrs. A. V. Lemaster's class gathered for a taffy pull. Those attending were Misses Grace and Ruth Allison, Grace Gates, Lucille Copeland, Georgia Grittan, Melvin Grittan, May Ross, Florine Wheeler, Miriam Hughes, Edna Klein, Mary Crouch, Viola Delgarno, and Jean Delgarno.

4 — The Grande Theatre will open Monday with a permanent stock company under the new management.

Covers were laid out for 100 Allen County K.U. alumni and their guests, the senior class of the High School.

The new school at Bassett will open for the first time Monday.

6 — Charles Smith, Humboldt, brought the plans for a new jury room to be built in the fourth floor of the courthouse. It will be twice as large as the one now which will be used for an office for Judge Foust.

8 — S.H. Kress and Company of New York City have purchased for $8,400 lots 11-13 on the east side of the square and will erect one of the largest department stores in this part of the state. The two existing frame buildings will be removed and a two-story brick building will cover the entire front of the two lots.

9 — Gov. Hoch has called a special session of the legislature to consider the subject of primaries.

The police are through warning. From now on any justified chicken-on-the-loose complaints will result in arrests.

11 — E.T. Fairchild, State Superintendent of Public Instruction, spoke to the county teachers and school boards today on consolidating the rural schools. He said that the per capita student cost in Iola was $1.38 whereas the rural school was $4 per capita, based on the enrollment, and $7 based on the daily attendance.

13 — A golf club for Iola is probably an assured fact. Parties interested in the sport have ordered all the necessary paraphernalia and have made arrangements for the use of the grounds at the end of north Walnut for temporary links.

14 — The officers of a taxpayer league are sending out letters to all parties who might be interested in such a group.

17 — A deal involving $12,750,000 was consummated in the office of the Kansas Portland Cement Company late this afternoon when the Kansas Portland of Iola, The Independence Portland, and the Indian Portland at Neodesha were consolidated and will be known as the United Kansas Portland Cement Company. The company offices will be in Iola. President is George Nicholson; vice president, A.B. Cockerill; treasurer, L.L. Northrup; attorneys, A.H. Campbell and John Goshorn. Owing to the large numbers of companies springing up it was necessary to consolidate the cost of management.

20 — What is believed to be a 10 million gasser was found on the Nash farm three miles south of LaHarpe. The well is the fourth in the field to be struck in the last two months. The Lanyon Zinc Co., which had the well drilled, finished their pipeline to the first wells today and began supplying the city of LaHarpe and the three Lanyon Zinc Works.

A.W. Lowry sold his grocery store out on south Kentucky to Ellis and Clark of the Hunter Grocery Co. The new owners will move it to their store on South Street.

22 — The mercury was blown out of the gauge on the new well on the Nash property. The rock pressure is believed to be better than any well ever drilled in the Kansas field. There has been a rush to purchase leases on adjoining farms.

24 — The Trinity Methodist Episcopal Church will burn their mortgage next Sunday. They have grown to a membership of almost 200.

The sixth well on the Nash farm is another 10 million gasser.

25 — The switch which the Santa Fe is laying at Carlyle to the site of the Lumberman's Portland Cement Co. plant is completed and the work will begin in a few months on the new brick plant.

27 — Jim Fredrickson, marshal of Bassett, was arrested and charged with intent to kill this morning. The arrest grows out of the shooting of William Cooper, a colored man, Saturday evening. Complaints had been given to the officer that Cooper was carrying a gun at work at the Iola Portland Cement plant. When the officer stopped him in front of Renfros restaurant, the shooting occured.

Iola is to have a new and up to date skating rink on east Madison. A group of local musicians bought the lot from George Bowlus and it will be directly across from his home. The men will be employed at the rink each night. An orchestra will also be formed so that the skaters can skate to orchestra music rather than band music. The men are J.V. Roberts, Jack Herring, Wilbur Shields, Carl Saylor, Bert Harris, Ralph Brown, C.R. Sucher, and Roy Livingston.

28 — By the end of the week the gas lines from the Lanyon field will be providing gas to the Kansas Portland Cement, Union Brick yards and LaHarpe East Smelters and the Cockerill Smelter at Gas City.

29 — Yesterday's legislative agreement gives Kansas a primary law for all parties, on the same day, for all offices, by a simple plurality vote except for the U.S. Senate whose nomination is by plurality of the legislative districts. This means that the party nominee is the one who carries the largest number of legislative districts, the entire vote of the state not being counted.

William Cooper died.

February

1 — The Iola Ministerial Alliance would like to invite the Rev. Billy Sunday to Iola.

The workmen completed the modern structure on the old Thompson Hotel site which will be known as the Portland Hotel.

A fire broke out next door to the fire station at 204 South Street. A restaurant and a barber shop were destroyed. The fire took over an hour to bring under control as the old hose broke several times and couplings on the new hose leaked.

6 — The State Board of Health will compel the city of Iola to install a complete sewage system. This will cost about $10,000.

The Gas City Council decided to macadamize the road between Iola and Gas City in order that the unemployed citizens may be given work until the factories resume operation in about a month. $200 was appropriated.

7 — The Iola City Council decided to purchase 1,000 feet of new hose.

8 — Lee Mossengale, superintendent of the Iola Electric Railway, received a letter from F.C. Hayden, former owner of the Webb City baseball team, saying he has the team and the money if Iola has the town and the park. There would seem no difficulty in getting the two together.

Officer Fredrickson was bound over to the district court for second degree murder. The $1,000 bond was immediately paid.

The Ministerial Alliance heard from Billy Sunday and he [illegible] ably come in April or May 19[illegible] would have to build a tabernacle [illegible] him.

Dr. J.S. Sutcliff purchased the site of the Horsetrick Co. Saturday. He owns the 12 acres adjoining the property which is next to the Allen County Hospital. He plans to build a sanitarium and a park on which work has already begun. It will be three stories with a complete basement. There will be two wind pumps placed on the property, one to supply the building with water from the spring which is located in a shale pit, and the other to supply mineral water for the baths. The grounds will have numerous driveways and gardens. Three thousand plants have already been ordered. There will be a lake covering half an acre with a fountain in the center.

12 — The physical work committee of the YMCA were established last night. Guy Fess will be in charge of the business men's class; Ed Owens, tennis; Frank Root, gym work; Aiken Heigele, basketball; Dwight McCarty, volleyball. W.H. Anderson is chairman of the committee and Hugh Jones and H.A. Street also serve. They plan to run two gym classes a week for young men and two for business men. 136 men have already enrolled.

13 — Baseball magnates arrived in Iola to look at the town. They decided in Tulsa yesterday Iola should be given first chance to join the league. They made final arrangements with Lee Mossengale and the 28 games will be played at the Iola Electric Park from May until Labor Day.

15 — The new Portland will be opened tomorrow. The Shields Orchestra will entertain the guests. It has 67 rooms; 15 have private baths. There are two parlors and a dining room which will seat 50. Mr. J.H. Young is the proprietor.

When the Y Society came into possession of the old business college on Jackson Ave., members took the first step toward securing a permanent YWCA. The suite of rooms over Shannon Hardware will be furnished and a matron hired who will make a homelike rest room for working girls. There will be a place where lunches may be eaten and a parlor for tired shoppers.

The YMCA up 'til now has been a temporary organization but this morning it became permanent and officers were elected. The chairman is Rev. Harnish. Elected president is J.S. Taylor; vice president, B.H. Bennett; secretary, G.W. Shadwick; treasurer, W.T. Smith. H.H. Vannuys and H.B. Adams were elected to serve on the board of directors.

The "Just the Girls" Club, lately organized by well known colored girls, celebrated St. Valentine's Day with an elaborate Leap Year party at Groomer's Hall. Dancing, games and cards were forms of amusement and an elaborate lunch was served at 11 o'clock. Little Miss Bell presided at the punch bowl and little Misses Ross and Ewell acted as ushers. About 30 couples enjoyed the hospitality of the club.

22 — The council voted to hire [illegible] to do work in the [illegible] will build a new [illegible] Washington Ave. to the [illegible]

24 — The Union Portland Cement Co. will begin construction on their plant in the next three weeks. They have been organized over a year but because of financial conditions work was delayed. It will be constructed on the [illegible]

March

3 — [illegible] Club is [illegible] Twenty [illegible] 10 new stalls [illegible] and a new fence [illegible]

The county [illegible] arrived at T.L. [illegible] Hardware Co. and will [illegible] J.E. Adamson, the seller [illegible] north of town [illegible] and animals [illegible]

7 — Five [illegible] the Wheaton trial [illegible] will be remembered [illegible] of the death of [illegible] at the Grande Theatre.

In a burst of enthusiasm the Iola High School [illegible] football team and get a [illegible] Iola, Humboldt, LaHarpe and Gas [illegible] Fred Smith was [illegible]

8 — OF A MISDEMEANOR. This is the verdict reached by the Wheaton jury. Will ask for new trial.

(Continued on page 4)

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(Continued from page 3)

Jury out all night before an agreement. Although the trial concluded in a night session and rain was falling, the biggest crowd that ever attempted to get into a courtroom was present long before the sheriff called for order. The space back of the judge's stand, the district clerk's office, the judge's office and the entire space reserved in front of the railing for attorneys was filled. C.H. Apt for the state defended circumstantial evidence. He referred to it as God-given evidence. He said that the hand of destiny was in the different circumstances that brought to light the crime the court was then considering.

18 — Earl Duggan writes home that for several weeks he has been down in Mexico where his company was sent to quiet the natives which had become unruly. Two years ago he went to Ft. Riley with Co. M and was so taken with army life he decided to enlist.

O.L. Bramlette, deputy state factory inspector, is in Iola today visiting factories and other institutions where labor is employed. In addition he will visit stores to see if they are observing the law regarding seats for lady clerks. Boxes etc. will not be accepted.

23 — The YMCA swimming pool opened for the season today.

24 — The YMCA launched a membership drive to obtain 500 new members.

Members of Mrs. Grant Miller's class of the First Methodist Sunday School gave an informal party last night to surprise Miss Ethel Culliom and Miss Zoe Atchison. There was an elaborate picnic at the home of the Culliums. Attending were Florence Hall, Elsie Bower, Grace Cockney, May Curtis, Laura Curry, Cleo Dickerson, Juanita Cooper, Grace Livingston, Alta Beatty, Grace Crawford of Kansas City, Miss Klein of St. Louis, Treasa Lee, Grace Marr, Margaret McClelland, Clara Hildebrandt, Helen Pollock, Clara Grangle, Essie Park, Zoe Atchison, Olive Frank, Lila Lee, Lillian Knowlton, Mrs. Maude Funk and Mrs. Grant Miller.

28 — Expert engineers of the agricultural department submitted a report showing it will cost $1,687,953 to protect the Neosho valley from floods. The plan is to assess the cost against the land and it is estimated this will cost $10.52 an acre. This will increase the value of the land to $40 an acre. It is suggested that all the bottomland between the state line and Emporia be protected by levees. They would be 900 ft. apart and would be kept clear of debris. The total length would be 398 miles.

April

23 — C.H. Apt, deputy county attorney, County Clerk Culbertson, and Sheriff Bollinger went over the county records and came to the agreement Allen County would have to elect two county commissioners this fall and that the two districts that should be voted on were commissioners Paul Klein and T.J. Anderson.

P.W. Jury, deputy assessor in Elm Township, announced the city of LaHarpe had decreased in population from 3,400 two years ago to between 1,900 and 2,000 this year.

County Assessor Charles Schaffner found personal property taxes in Humboldt jumped from $74,000 last year to $475,000 this year. It would seem like when the law became generally known, and its penalty, Kansans over the state began discovering a great deal of property.

24 — E.B. Butler, west of the river, returned from Wichita where he inspected an oil traction machine for threshing and plowing. With 50 gallons of oil the engine will prepare 25 acres for planting in one day, replacing four plows.

Another corps of surveyors, running the route for an electric railroad, are headed for Iola. They are in the employee of Kansas City and Kansas Southwestern Railway Co.

28 — Directors C.J. Duane, G.W. Shadwick, J.W. Napier, W.H. Cook, Al Ellis, J.H. McMurry, Randal and T.S. Ball of the Baptist church voted to request the ladies wearing the Merry Widow hats to remove them when they enter the building.

30 — It has been suggested that the city council issue coupons for free baths, which are to be given to the YMCA members to give out to boys that do not have access to baths. The YMCA management would take up the coupons and return them to the utility department in payment of gas, water and electricity for the Y building. Dr. Glynn said the plan would work against dirt, debt and the devil, members presumably having the opportunity to influence the boys.

May

2 — In a literary contest of intense rivalry the Iola High School last evening won honors from Ft. Scott High School by taking the debate, oration and essay and was awarded the prize cup. Ft. Scott took the declamation and solo. The debate was "Resolved: The closed shop is advantageous to the country as a whole." Iolans Dean Bilbe and Claude Nigh took the negative.

The members of the graduating class of IHS will present Tennyson's "Princess" in a dramatized form in the class day exercises May 8th. Graduates are Thomas Bartlett, N. Essie Beck, Lois May Bennett, Mary Cannon, Alfa Irene Duncan, Nannetta Maude Edgar, Marguie Eva Fowler, Iva Rebecca Gard, Elsie Hermine Heldner, Minnie Marion Johnson, Edna Carman Keith, Mary Genevieve Long, Mildred Maurine Manley, Lillian Vale Melvin, Alice Vanetta McCall, Grace McCarty, Clinton McClure, Mary I. Smith, Velma Esther Shelley, Florence Avis Spink, Florence Thompson, Ralph B. Thorpe, Blanche Van Buskirk and Lettie Mignon Wooxlin.

4 — Iola collected $5,922.70 in fines and costs from the police court for the year. Chanute reports $1,500.

Last August Capt. E.E. Whitaker took charge of the Salvation Army here and found a debt of $443. The captain hates debt and through donations has paid off $20. His salary is $3.00 per week, so it is plain to see the money is not being used in that way. There are meetings every night of the week and the work is worthy of the support of the people.

The Northrup National Bank brought suit to foreclose a mortgage on the Webster Refinery in Humboldt to satisfy an indebtedness of $8,027.

13 — Democrats from every township in the county are in the city today meeting at the K of P Hall. The conference's purpose is to draft candidates for county offices. Three hundred are attending and they will have a banquet tonight at the YMCA. The reception committee is M.G. Robinson, F.M. Thompson, O.R. Bush and Paul Klein.

14 — Mrs. W.P. Wells of this city, president of the Second District Federation of Women's Clubs and a prominent club woman, called a meeting Saturday for the purpose of organizing a city federation. The plan has been under discussion three months and has come to an affirmative vote in Unity, Sorosis, Art and Current Events clubs of Iola and the Progressive Club of Gas City.

Lawrence: Fred Apt on Stand. Jointists give up fight. The student journalist exposé of the joints in the bottoms came to a glorious finale in district court this morning when, after two student witnesses had testified to the purchase of liquor, eight defendants marched up to the bar and pled guilty.

15 — Two deeds which may involve many thousands of dollars were filed today in the Register of Deeds office when the LaHarpe Smelting Co. and the Cherokee Lanyon at Gas City sold to the Cockerill Smelting Company.

The boys' declamation contest at the YMCA last evening was won by Barney Miller. Others in the contest were Harold Bowe, Arthur Metcalf, Reese Jordan, Charles Broughton, Carl Morey, Jesse Morey, Fred McEwen and Glen Gerbitz.

"The road will be built as soon as all the papers are finished, the money will be ready to draw on." The above statement was made by F.V. Crouch, president of the Kansas Southern Railway Co. who returned this evening from Paris where he has been working in the interest of the road.

19 — Mrs. J.F. Sutcliff, 39, wife of Dr. J.F. Sutcliff, died yesterday following an operation Saturday. Her illness was due to an abdominal tumor after which peritonitis set in.

Orphan Home Notes: The children think April is the grandest month. We got a bathroom and a swing and Easter came too. Someone brought us 22 dozen eggs. We have 23 children and our table is full, only seating eight.

21 — It has been announced that the Arcade Hotel on West Street will add a third story and that the new rooms will be occupied by the Iola Business College.

22 — The council instructed the city attorney to draw up an ordinance requiring all amusement places to be closed on Sunday.

George Rhoads of LaHarpe announced today that he has completed the deal for the purchase of the Albany Glove Factory of Albany, Mo., and that he would move it to Iola at once, where it will be known as the Iola Canvas Glove Factory. It now employs 70 girls and a number of men. There will also be a second factory of this kind for Iola. C. McClell, a traveling salesman, announced yesterday that he would open one here within 30 days.

26 — The climax of the Whitlow case was reached this morning when Samuel Whitlow told his story of Miss Mae Sapp's alleged infatuation for him. His story relates a passionate love of an accomplished and prepossessing girl of 27 for a married man many years her senior. It is a story of piteous entreaties, insistent pleadings and fervent protestations of love. It is the story of frequent visits to his home under the cover of night that she might catch a glimpse of his face or hear the sound of his voice. It is a story of a love that grew into a frenzy, its victim preferring self destruction rather than endure love unsatisfied. Noisy children grew silent, nervous women became motionless and restless men gazed upon him with wondering eyes, for it was one of the strangest, most remarkable stories ever told from a witness stand in the history of the Allen County Courthouse.

28 — A gas well drilled on the Ma... Means farm 3½ miles SE of LaHarpe, is estimated to be a 20 million gasser with the rock pressure 380 lbs. This will mean the development of an entirely new field. It was drilled for John Wood and George Bowlus.

30 — Practically every society or secret organization in the city today took part in the memorial ceremonies in commemoration of the nation's dead. Twenty-six societies and three bands marched to the cemetery from the McCook Post and back again to the square. The Honorable A.B. M... ... of Osage City gave the address.

Postmaster Spencer received the plans of the new post office building to be constructed of brick and stone. It will be a one story building 80 by 65 feet. At the right of the main lobby will be the money order, registered letter and stamp window. Facing the entrance will be two sections of postal boxes. At regular intervals there will be seven windows for the use of carriers. The postmaster's office will be in the north west corner. Leading from this office will be a ladder to the garret, which is equipped with a lookout so the postmaster can view the entire interior of the office from this point. In the basement will be what is known as a swing for the use of the employees during idle hours. The swing room will be equipped with lockers and a shower bath will be across the hall.

31 — (A Sunday). The Register got out an Extra with the news that Whitlow is not guilty. The jury was out 36 hours. This case has attracted attention throughout the Midwest.

June

5 — One of the most sweeping ... rigid measures ever passed by Iola's city council will become known as the Sunday Desecration Ordinance. ... prohibits anyone from laboring or working on Sundays and from selling or disposing of goods, wares or merchandise.

(Continued on page 6)

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8 — The YWCA met in a mass meeting Sunday afternoon and elected Mesdames H.A. Ewing, Phillip Hough, A.V. Jodie, [illegible] Carrigan, J.A. Devlin, and Misses Carrie McDowell, Mary Bromberg, and Dr. Edith Haigh to the board of directors.

15 — According to figures turned in by the assessor Allen County lost 2,444 in population last year. This brings the total under 30,000 which means most of the county officers will have their stipends reduced considerably. The salaries will be reduced from $100-500. During the financial depression several factories closed and the employees left town.

The Sunday closing ordinance was generally observed for the first time yesterday. It is said the police took the names of the employees of The Daily Index, which is a morning paper, who went to work last evening. Citizens whose horses are kept in downtown liveries had to hitch up their own horses as liverymen could not. People walked to and from the depot. One man borrowed a delivery wagon from a neighbor to get his wife's baggage to the train station.

20 — Officer Jim Frederickson was found guilty of fourth-degree manslaughter in the shooting of William Cooper on Jan. 25. Cooper resisted when Frederickson tried to arrest him and Frederickson shot him.

23 — Cigars and tobacco are the unobtainable items in Iola on Sundays and the usual delegation made the trip to Gas City and the Electric Park in quest of the fragrant Havana and the amber plug.

JULY

1 — A new law is needed to put the work of the census taker in the hands of one man. The figures on births and deaths are erroneous, say doctors. Some census takers admit they forget to ask these questions and some have not turned in any figures at all. It may account for the fact that the figures on population are considerably less than is usually expected. The school population is done by one person, which has proved to be a good thing.

A crew of city workmen are constructing an electric line to Riverside Park. About 11 poles will have to be set from West Street through the Davis Addition. It may be a permanent line, although it is being put in for the W.O.W. activities on the Fourth.

The Iola Glove Factory began manufacturing gloves today. It is located at 118 East Jackson.

3 — Iola is ready for the 4th. The Electric Park and W.O.W. have elaborate programs. Sen. Charles Curtis will speak to both groups.

6 — Clint Heaton, proprietor of the Eagle Cafe, was shot to death in his restaurant last night by his divorced wife, who is now in the county jail.

Lee Massengale, superintendent of Electric Park, said 19,007 people passed through his gates yesterday and the Iola Electric railway handled 25,606 people.

10 — George Sheldon, governor of Nebraska, who is lecturing at the Chautauqua this afternoon in Iola, was asked if Nebraska would receive the news of Mr. Bryan's nomination with statewide pride, said, "Naturally, so, but nevertheless we expect to carry Nebraska for Mr. Taft."

For the first time information is available to allow the calculation of per capita wealth in the cities of Kansas. Iola has a population of 10,079 and a per capita wealth of $364.80. The populations given for the other cities in Allen County at this census: LaHarpe, 2,218; Gas City, 1,487; Humboldt, 2,149; Moran, 558; Savonburg, 242; Elsmore, 242; Carlyle, 845.

14 — The old stone stable opposite what was the Leland Hotel which was replaced by the handsome brick Hotel Portland, is now being torn down to make room for a fine two-story brick building. The lower floor is to be [illegible] and the upper floor [illegible] lors.

In [illegible] A. [illegible] has [illegible] today. Iola [illegible] [illegible] [illegible] [illegible] [illegible] Bruce, Flinn [illegible]

21 — [illegible] of the Iola Mushroom [illegible] announced [illegible] would begin on the [illegible] immediately east of the [illegible] of the Iola Electric Railway [illegible] east Iola.

22 — There will be an elocutionary recital tomorrow night under the auspices of the Christian Endeavor Society at the Christian Church. Providing music will be Misses Lillie Armstrong, and Mable Williamson and Messers George McClenathan and Ernest Davis, Miss Goldie Penner and Mr. R. Boatright. Readings will be given by Velma Shelly, Neva Ritter, Pearl Mitchell, Mildred Manly, Katie Root, and Marjorie Garlinghouse, who will present "My Ma and The Fishing Party."

23 — The pipeline which the Kansas Portland Pipeline Co. is laying between Wilson County and the Iola Portland line which now extends almost to Humboldt has been connected and workmen are now laying branch lines to wells which the county owns in Wilson Co. The line will furnish gas to the Iola Portland Cement Co. and to other Iola factories.

24 — The council provided for the paving of E. Jackson Ave. between Jefferson and Cottonwood streets. It is to be paved with macadam with a tarvea surface. This will be the first paving of this kind in Iola. It was also decided to pave East Lincoln St. with crushed retorts and crushed stone with a surface of oil or tarvea.

S.H. Bassett, who has been connected with the Iola Portland Cement Co. of this city, has tendered his resignation.

28 — A Booster Club, an organization of citizens devoted to the future of Iola, was instituted last night. Officers elected to help secure industries and encourage people to locate in Iola were: A.W. Beck, president; J.D. Mundee, secretary; J.V. Merchant, treasurer. Harry Sleeper, Ray Taylor, C.E. Newton, J.F. Davis, T.H. Shannon, J.V. Roberts and W.L. Crabb, members of the executive committee.

August

1 — There's a fine job awaiting the man who can contrive some satisfactory arrangement for a Sunday lid in Iola. True, Iola has a lid, but it don't seem to fit. It's causing fits. The sentiment is in favor of a Sabbath observance but while some want it rigid and hermetically sealed, others would permit the sale of ice cream, cigars, etc., but close the amusements, while others "don't want no lid at all." The demand became so strong lately that the police department notified merchants that they would not interfere with their sales of newspaper and iced drinks or the operation of livery barns, etc. Meantime, J.M. Collins, police judge, has heard of the plan to permit some businesses to run and to prevent others and he says this sort of policy will not do.

George Atkins, cement plant laborer, died as the result of a side-wall caving in at the cement plant [illegible] him with rocks.

[illegible] are gradually being [illegible] at the cement plant after [illegible]

[illegible] marshal of [illegible] to serve not less [illegible] more than two years [illegible] in the Kansas penitentiary [illegible] Judge Foust this morning. He [illegible] found guilty of fourth-degree manslaughter in the killing of William Cooper several months ago. The case will be appealed to the Supreme Court.

13 — The rural areas continue to fight the Barnes law, which provides that high schools cannot charge tuition. This means county taxes must be increased to provide for the additional enrollment. The rural citizens find this an expensive luxury and argue they would be better off to found a new high school at some central point and maintain it [illegible] ahead under the Barnes law [illegible] Commissioner [illegible]

14 — [illegible] started to [illegible] the [illegible] the Barnes law.

Will Burgess was wading [illegible] river yesterday and spent some [illegible] opening mussel shells. While [illegible] this he found a pearl about the s[illegible] a small pea, brought it to town [illegible] had it set by a local jeweler. [illegible] the pearl is worth about $75.

A very pleasant automobile [illegible] being planned this evening [illegible] Misses Emma Krause, [illegible] ne, Mr. Bud White and Mr. and [illegible] C.B. Krause will go to [illegible]

Oliver Kinman, 15, died [illegible] of lock jaw.

27 — The county commiss[illegible] voted to put the Barnes law [illegible] the upcoming ballot. Before it [illegible] fully handled by the courts, it [illegible] decided by the people.

28 — 13,000 attended [illegible] yesterday. Over 200 Iola [illegible] marched to the fairgrounds [illegible] morning from the square behind [illegible] W.O.W. band sporting badges, [illegible] and some original banners.

September

8 — Today is the first day of sc[illegible] The teachers met Saturday and [illegible] over the state course of study [illegible] will be used this year instead [illegible] county course. Cooking has [illegible] added to the high school course [illegible] a model kitchen as been outfitted [illegible] third floor.

[illegible] — The [illegible] of the [illegible]

[illegible] Grove Line and Portland [illegible] Co., has been [illegible] The [illegible] only had to build the plant but [illegible] put it into operation and run [illegible] two months to show the machine[illegible] good running condition [illegible] by a force of capable men.

(Continued on page 8)

Iola's citizens bought a quarter-block at the intersection of Walnut and West streets and gave it to the United States government for a federal building site. This view surveys the site from the southwest and looks across the Iola Electric Railroad tracks that run down West Street to connect with the north-south line which took workers to the Lanyon Smelters north of Iola. The postoffice contract was let Nov. 25, 1908.

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(Continued from page 8)

17 — One of the largest crowds that ever came to Iola to see a circus is here today. A two mile parade delighted the thousands of people. A corps of trumpeters led the parade, followed by 24 pure white horses pulling a great golden band wagon. Behind them rode 1,200 people on beautiful horses, elaborate floats, in richly draped howdahs, on the backs of elephants, and on ornate rolling thrones. There were nearly 700 of the most beautiful horses you have ever seen.

The police raided every 2 percent place in town and arrested 13 men. It was recently decided 2 percent was intoxicating and therefore a violation of the law.

It is estimated that fully 18,000 people attended the afternoon Ringling Brothers Circus performance and 7,000 saw the evening show.

The ouster suit brought against Commissioners Paul Klein, George Reynolds and T.J. Anderson by Attorney General Fred Jackson will be tried this term of court. The action was brought some time ago but has gone through many delays. The original action concerned allowing salaries illegally. Since then the state has amended its petition to include 230 causes of action, any one of which is cause for ouster. The amount concerned is over $20,000. The prosecutor stated that if the action is upheld, he would immediately begin to recover bills which were illegally allowed. The importance of this case can be seen at once.

22 — Several hundred colored people are down at the park attending the Emancipation Day celebration.

25 — Fully a thousand people gathered at the Airdome last night to kick off the first Republican rally of the coming campaign.

Whitlow is free. After deliberating 12 hours in the Whitlow perjury case the jury arrived at the verdict of not guilty early this morning after an all-night session. In the May term of court Whitlow was tried and acquitted in the murder of Miss Mae Sapp. There are several murder trials going on in Iola at this time.

30 — Iola's Boosters are off to Yates Center tomorrow to participate in their stock show and parade.

The Horton Concrete plant is being torn down and moved to Kansas City to save on the freight of their product. The offices will be moved about the middle of October.

October

1 — James Rodgers, president of the Lanyon Smelter Co., stated this morning that within 10 days there would be enough ore on hand to start up four blocks and as soon as more ore is available the rest of the blocks will start. This will employ about 200 men. The No. 2 Smelter will not be started until next year.

It was decided to abandon the deep well that had been dug to a depth of 3,450 ft. It is the deepest in this section of the country. Tools have been lost in the well and they are difficult to retrieve without a lot of trouble and expense. About $21,000 has been expended. The city put in about $3,000.

2 — A solution has been reached by the council in connecting the many city gas wells on the west side of the river to the city's gas main. They will build a line through Acers Park. Mr. Acers giving the city the right of way in return for an arc light in the park, known as Mineral Park, and the furnishing of free gas and light for the park well and house.

Councilmen C.V. Dennis, Vezie and G.E. Glynn, serving on the water committee, will inspect the dam on the Neosho River. Within two years, and possibly less, the dam at the Iola city water power house must be rebuilt. It must be repaired in the immediate near future.

3 — L.L. Northrup received a communication from R.C. Rawlings, president of the Inter State Railway Co., telling how much it will cost the towns along the route to get the road. The letter states that a large bond house in New York has agreed to take 75 percent of the bonds provided the other 25 percent can be raised. Iola's portion would amount to $100,000. The total cost is $7,565,000.

9 — A Republican Club was organized last night in Bassett of 26 members with Dr. J.B. Bass as president and Ray Richardson as secretary. Saturday night Dr. Bass will address the group speaking on the Brownsville affair and also the matter of a colored man running for the constable of Bassett on the Democratic ticket.

E.L. Smith bought out the photograph gallery of S.L. Stanfield.

10 — Electricity as a lighting agent is growing more popular and fast superseding gas, according to N.E. Sims, superintendent of the electric department, who reports he is getting more orders for changes than he can fill.

12 — Weeks of planning have gone into tomorrow's big political event when the Honorable James Wilson, Secretary of Agriculture, will arrive on the morning train. He will be joined by W.R. Stubbs and Congressman Scott who will arrive with him. The pyrotechnic display tomorrow night will be one of the most gorgeous and elaborate ever held in Iola. The business center of the town will be bright as day with the flashing of Republican candles, the glow of the "red fires" on the street corners and the waving torches carried in line by 1,000 on foot, in automobiles and in carriages. Everyone is laying in a stock of horns.

Henry Steyer, the grocery man, will give out 500 horns tomorrow night after 6 p.m.

13 — Fully a thousand people were at the Missouri Pacific depot to give a hearty welcome to the distinguished visitor, Sec. Wilson and Congressman Pollard of Nebraska, the keynote speaker today. The reception committee, composed of 60 party leaders chosen from every precinct in the county, the G.A.R. and three bands gathered an hour before train time. A committee composed of L.L. Northrup, Capt. H.A. Ewing and others went to LaHarpe on the car line and rode back to Iola with the distinguished party.

14 — The great crowds of people day necessitated a change from the Grande Theatre to the Opera House for the distinguished speakers. Hurried plans were made to furnish oratory to those still unable to get a seat in the house. D.P. Northrup's big automobile was confiscated and parked in front of the Opera House where Mr. Stubbs mounted the back seat and spoke to the crowd for nearly an hour.

The high school will be fumigated today after the discovery of a case of diptheria.

20 — The work of making the repairs on the dam west of town is progressing rapidly. The gas pipe to the west field has been laid on top of the dam and will be covered with cement.

22 — Mrs. W.D. Wolfe of Iola was elected president of the Second District of the Federation of Women's Clubs which concluded its meeting today. At the Elks' Hall last night a reception and musicale was given to compliment the clubs. Mrs. J.T. Price of the city federation gave the welcoming address and music was provided by Misses Katherine Jones, Josephine Riddle, Florence Hobart, Clara Craggs, Messers F. Bennett, Smith, Edwin Hunter and Mrs. P.E. Waugh. Two quartettes of Miss Jones, Miss Julia McClure, Mrs. A.V. LeMasters, Mrs. O.T. LaGrange, A.L. Boatright, J.G. Allen, Dr. Garlinghouse and W.G. Anderson sang. The Bonsoir Club playette was presented.

24 — It has rained 7.84 inches in Iola these past six days.

26 — James Bradford was killed and George Graham was injured in a cave-in at the Iola Portland Cement Co. yesterday. They were digging in the shale pit and it is supposed that recent rains and blasting loosened the soil.

Gov. E.W. Hoch will arrive in Iola today to address a rally at the Majestic Theatre this evening.

Spencer, the small son of Mr. and Mrs. S.A. Gard, is convalescing after an attack of typhoid fever.

November

4 — A sweeping victory for Mr. Taft in yesterday's election. C.F. Scott wins. Allen County Republicans lose but one race. William Jennings Bryan carried Humboldt by a narrow margin. An eight page extra was printed at 4 a.m. Frank Travis was elected to the state Senate. W.F. Watson was sent to the state House of Representatives. W.R. Stubbs is governor and Chester Long was returned to the Senate.

A notable feature in connection with the receiving of the election returns in Iola was the complete and prompt service rendered by the Bell Telephone Co. E.J. Bohra, manager of the exchange, remained up all night supervising his experienced staff who were able to give the public the election bulletins as fast as they were received. Special services were also rendered by the three Iola newspapers, the Republican and Democrat headquarters and the W.C.T.U. The Register displayed the returns on the south wall of the New York Store with the aid of a large stereopticon. A crowd of about 3,000 people assembled there early in the evening and remained far into the night.

5 — The Great White Way w[...] initiated in Iola when the bus[...] houses on Jefferson Ave. betw[...] Madison Ave. and East Street [...] nine 200 candle power lights [...] lights will be kept aglow until [...] night. The work of stringing [...] lights began yesterday. Later th[...] tire business district will prob[...] adopt the idea.

7 — Brownfield and Davis [...] manufacturers, have completed [...] move into their handsome new [...] two story building on east Mad[...] Ave.

9 — The indications are that [...] Barnes law will carry in the ci[...] by about 200 votes.

J.C. Strong, prominent A[...] County stockman, was found de[...] a cow lot on his farm near Moran [...] night.

10 — Over 3,000 people, bubb[...] over with joy because of the swee[...] Republican victory, gathere[...] cheer for Taft, blow horns, shoo[...] fireworks, carry torches in the [...] ade and make the town ring. E[...] Democrats and eight Republi[...] had wagered that the loser sh[...] ride the winner around the squa[...] a wheelbarrow. Otto Hutton car[...] ly wheeled Henry Steyer around [...] a smile on his face till the close of [...] tourney when he joined in the [...] Bell Varner, who is a strenge[...] manual labor, found the evening [...] of Guy Taylor somewhat heavy [...] fore the stunt was over but he m[...] ket on. He is wearing court plaste[...] his hands today to hide the blist[...] E.D. Bryant, who pushed R.B. [...] around, found every rough spot [...] road. J.M. Ross was ill but has p[...] ised to ride W.A. Long around w[...] he recovers.

11 — A.G. Reynolds will ope[...] the Majestic Theatre tomorrow n[...] with a moving picture show. [...] talking machine has not yet arriv[...] however Mr. Reynolds has a fine [...] of pictures. Mrs. Ben Servey will s[...] the illustrated songs.

12 — Alleging that her husba[...] Richard Bailey, met death in [...] machinery at the Prima West[...] Smelter Co. through no fault of [...] own but through the neglect of [...] company, Mrs. Katie Bailey ha[...] brought action in the district co[...] for $10,000. Mr. Bailey left his w[...] and two small children. He was wo[...] ing $2.00 per day for shoveling [...] into the hopper and was 46 years [...] age.

The grand opening of Kress' [...] and 25 cent store will take pl[...] tomorrow. The unusual red exter[...] looks very auspicious. Their ha[...] some display windows facing so[...] Jefferson show elegant fixtures [...] harmonized cherry color fitt[...] throughout with mirrors, elect[...] lights and magnificent show cases.

13 — The Marchioni Club, recen[...] ly organized by a group of you[...] men, gave their first entertainme[...] a dance, in the Masonic Hall [...] evening. It is the purpose of the cl[...] to have something doing during t[...] winter plus picnics and outings in t[...] summer. Officers are Walter McVe[...] president, Henry Fiske, vice pre[...] ident; Guy Poss, secretary-treasure[...]

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and the floor caught fire. E. D. Shields, Frank Wood and Millard Teets.

It is probable that Mrs. M.A. Turner, mother of Mrs. Harry Huber, who was murdered by her husband, formerly of Iola, will not be obliged to sell her home to pay her daughter's funeral expense. Her home was given to her by the Missouri Pacific when it's head-on collision in Mexico 11 years ago a man was killed. Her husband was the engineer and the man is in jail where he pursued to death. The property is that in which the murder and suicide took place. Charitably inclined persons have volunteer assistance in Wichita. Mrs. Turner's 16-year-old son, a messenger boy for Western Union, will support his mother and Mrs. Huber's two children.

Another block of the Lanyon Zinc Smelter No. 1 was started this morning, giving employment to 24 men. A block at the United Zinc Co. also has been started, making the plant run at full capacity for the first time in a year. Ore conditions are getting better, according to company officials. J.B. Kirk, superintendent of the Lanyon Zinc Smelters, said their smelter at LaHarpe would be the next to start.

18 — Mr. and Mrs. George Bailey and son were all thrown from their surrey on the main street of Bassett when a large red touring car frightened their team. Mr. and Mrs. Bailey were both injured. Farmers stopped their team three miles south by blocking the road with hay.

The brick plant of the LaHarpe Shale and Brick Company burned to the ground today. It was thought it originated by a grass fire and the firefighters did not have access to water. The loss is estimated at $6,000 and it is not likely the owners will rebuild at this time.

23 — Ewing, Card and Card today received word from Washington, D.C., that in the case of the Brandon heirs vs. N.L. Ard of this county, an action which has been pending 21 years, the U.S. Supreme Court found for their client, Mr. Ard. The action was one to recover 80 acres of "League" land near Elsmore which Mr. Ard had homesteaded in 1866. Mr. Brandon bought it from the Katy railroad and brought suit in 1887. Mr. Brandon claimed he bought the land from the railroad before Mr. Ard's taking possession of it. During the various trials the Cleveland administration had taken steps to recover all the "League" land in this section but lost except on three 80-acre pieces. This trial delayed the settlement the Ard trial considerably.

27 — Iola, LaHarpe and Gas City's Tripleta defeated the Chanute Cardevils 42-8 on Thanksgiving day. Much is due to the masterly generalship of Add Brennan. The game, beginning late, the sun went out of sight, the new moon came out while the approaching night robed the bodies of the gladiators in its shade before the combat closed, but for a spectator left although the darkness became so intense it was almost impossible to distinguish the players. The excitement ran as high that whenever a warrior fell and there was the slightest reason to believe there was a fell hand, the crowd pressed against the wire, hungering to rush out to the gridiron. Towards the last when Logan Campbell take your note off to the same mind confronting a Chanute player in what appeared to be an unfriendly attitude, pandemonium broke loose and the thousands of enthusiastic swarmed out on the ground. What it was feared an personal encounter had taken place the crowd went behind the side line again.

28 — The rolling stock, machine shop and car barn of the Iola Electric Railway were destroyed by fire this morning. Four street cars were totally burned leaving only two for regular passenger service and a freight car. They were parked outside as the barn was full. Frank Bradley, night car barn foreman, returned to the car barn from the power house at 1:30 a.m. to find the barn flaming when he opened the door. The cause of the fire is a total mystery. Lee Massingale, general superintendent of the railway, estimates the damage at $35,000, part of which is covered by insurance. Firemen finally got the blaze under control at 3 a.m. and were able to save the power house next door. This morning only the scorched brick walls and a small portion of the roof remain. A 45 minute schedule will try to be maintained between Iola and LaHarpe. The small car No. 1 and the big passenger car No. 8 will be assigned to the main line, both running from Bassett to Concrete in the round trip. The freight car will be used for passengers in the early mornings and late evenings. It was raining heavily at the time of the fire.

Miss Bordetta Woods of Elsmore is a guest of friends here for the week, she is attending the teachers association meeting.

December

3 — It has been definitely established that Kansas City's gas shortage is due to insufficient flow lines from the gas producing belt and the pumping stations in Sumner, Graham and Petrolia. The consumption of Kansas City is a great deal more than expected. Kansas Natural Gas has been attempting to feed Kansas City and a half dozen other cities with two 16 inch mains 160 miles away. At Ottawa the main is tapped by a network of 10 inch to 12 inch mains which convey gas to St. Joseph, Topeka, Lawrence, Atchison, and smaller communities and what is left is forced on the Kansas City. Last night only 22 lbs. of pressure was going through, 5 lbs. less than normal.

4 — A suggestion being drawn up for adoption by the city council last night would make street commissioner J.S. Walker also sidewalk inspector. When he locates a walk in bad repair or one that should be rebuilt, he will call upon the property owner and notify him of the condition of the walk. If the owner wishes to take care of the walk he is given 30 days, otherwise the city can attend to the walk and charge the cost to the property owner.

Parties interested in extending the street [illegible] the north side of the square [illegible] will be commenced at once. This makes a total of four blocks.

6 — Rev. W.H. Garfield [illegible] of the Ministerial Alliance, received a letter from Billy Sunday saying he cannot possibly come to Iola for several years.

7 — Lee Massingale returned from Buffalo, N.Y. where he bought five new 40 ft. cars which are being loaded today for the Iola Electric Railway.

While drilling for gas near Colyer, The Lumberman's Portland Cement Co. went through a big vein of coal at a depth of 906 ft.

8 — Nelson Acers, for 12 years one of the foremost citizens of Bourbon county, died at his home yesterday. He came to Iola in 1866 and practiced law. He was county attorney two terms and was elected probate judge. The discovery of mineral water here by Acers was responsible for his leaving the law. He conceived the idea of establishing a sanitarium and did so with considerable success, but for lack of local interest the project failed. He then went into politics and real estate.

11 — The county commissioners have decided that the law concerning the grading of the township treasurers must be followed. It apparently never has been. The treasurers are required to make their bond [illegible] the money they are handling. They have been putting up much less. Example, the Iola township treasurer [illegible] should pay $3,[illegible] on the $3,[illegible] he is [illegible]

[illegible] to have [illegible] a county [illegible] among the [illegible] requests [illegible] County has [illegible] mind short to have [illegible] remains in the [illegible] Legislature, L.E. Pearson of Salem township, who has been active in [illegible] Brand the [illegible] regular bill in the evening [illegible]

18 — The city council [illegible] a list of [illegible] Pacific Railway [illegible] bridge over Deer Creek [illegible] and Benton Streets [illegible] petition from [illegible] the Commercial Hotel [illegible] ladies parlor. [illegible] and entering the [illegible] meeting of all [illegible] al current of consumers who [illegible] arrears after the 10th of each month. A fee of 50 cents will be charged for all assessments wanting [illegible] treatment.

Iolans who are hoping [illegible] tric line from Kansas City [illegible] pendence via Iola may [illegible] learn that the two proposed [illegible] have merged.

23 — C.C. Lacock [illegible] the contract for the [illegible] quired at the post office [illegible] began this morning when they [illegible] two large cottonwood trees.

24 — No alert [illegible] will have to [illegible] local day for [illegible] the week [illegible] have the [illegible] the [illegible]

[illegible] picture in the excavation for the [illegible] was taken from Walnut looking [illegible] left background was the North [illegible]

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1909

January

2 — Under the direction of J.M. Rodgers, superintendent of the municipal gas department, Grant Bittle and C.V. Dennis, inspectors pro tem, today completed the first annual gas and water consumers' inventory. An exhaustive check of consumers was made. At each house an inspector paid a visit and the occupants were subjected to a searching inquiry as to the number of stoves and lights and as to water service. Several places were found where it was quite evident that more gas than was being paid for was being consumed. In these cases arrangements were made for prompt payment. Residents were given the choice of paying or facing prosecution for connecting pipes without a permit.

GAS CITY — R.A. Johnson, who has been the manager of the Shannon Hardware store since it was established in this city, has resigned. E.T. Stanley, formerly manager of the Shannon store at LaHarpe, will take charge.

Not a Christmas or a New Year's Day drunk. Not a single case arising from an undue celebration of the holiday season. That's the record for the Iola police court. Comparing this record with that of other cities, it places Iola in a most favorable light.

4 — At a meeting of the board of directors of the Iola State bank Saturday afternoon, it was decided to increase the capital stock $12,500, add to the present surplus $5,500, pass to the undivided profits account $1,280, making a total capital stock, surplus and undivided profits account total the sum of $34,780 or double the previous capitalization.

The ouster suit against the county commissioners is on today in district court. It was decided some time ago that the case should be tried before the terms of County Commissioners Paul Klein and T.J. Anderson, who were defeated for re-election, expired on January 11.

A deal was closed Saturday between J.R. Stewart and George J. Fox of LaHarpe whereby Mr. Fox becomes the owner of the handsome residence on East Madison recently built by J.H. Campbell, cashier of the Iola State Bank. Fox is president of the LaHarpe State Bank and will make his home here.

5 — W.E. Woods, president of the Lumberman's Portland Cement Company, Mr. Victor Beutner, construction engineer of the company's cement plant, Mr. B.W. Ballou, construction engineer of its brick plant, and Mr. J.R. Lampat, superintendent of brick plant construction, are at Carlyle today where active work on both plants will begin at once.

After hearing the evidence in the ouster proceedings brought against the Allen County commissioners, Judge Oscar Foust this morning found for the defendants.

With revivals going on in three principal cities in Allen County — Iola, LaHarpe and Gas City — there ought to be a religious awakening of no small consequence. And if the churches in Savonburg, Elsmore and Humboldt should fall in line there would hardly be a spot in the county where Satan could light.

7 — Supt. Mavengale of the Iola Electric says there is from four to six inches of ice covering Rock Creek at the company's power house. Workmen today cleared the ice of rubbish, electric lights have been swung over the creek and everything is in readiness for those who care to skate.

9 — The kiosk is here. The name sounds like it might be an animal, but it isn't. It is the instrument shelter which Uncle Sam is sending in which to exhibit certain instruments belonging to the weather station. It will be set up in the southeast corner of the courthouse yard as soon as the weather will permit. The shelter is made of metal but has four glass sides, showing the instruments and the records they keep of the weather conditions. It stands about 10 feet high and is about four and one half feet square at the base.

The traveling men living in Iola and vicinity are requested to meet at Brownfield and Davis offices tomorrow afternoon at 3 p.m. for the purpose of organizing a Union of Commercial Travelers Association. There are 24 "drummers" in Iola and two in Humboldt which means a strong organization for this county.

11 — Walter R. Stubbs of Lawrence was today inaugurated Governor of Kansas, succeeding Edward W. Hoch.

Justice G.B. Potter today began serving his eighth term as justice of the peace. He has served in his present capacity for 14 years.

The Salvation Army has opened a shelter for the homeless at their hall at Madison Avenue and Walnut Street. The hall will be warmed, lighted and left open all night during the cold weather and any wanderer who has no money or no place to go to spend the night may seek refuge there.

12 — Mr. A.C. Parsons and Mr. J.H. Timmons of King City, Mo., have bought the Gard and Taggart poultry and produce plant located just west of the ice plant and will start up the business once again.

A report of activities of the YMCA for 1908 showed the institution has increased to almost doubled attendance over the previous year.

15 — The municipal gas department has made arrangements to purchase gas from the United Zinc and Chemical Company and workmen are today engaged in making connections from the company mains to the city mains.

16 — T.J. Trodeny of Allen County has been elected treasurer of the Kansas State Board of Agriculture.

20 — Sen. Frank Travis has introduced a bill in the Legislature to get a state appropriation of $1,000 a year for the Orphans' Home and $500 a year for St. John's Hospital.

27 — Katie Early won $5,168 from the Prince Western Spelter Co.

M.J. Frishman, the dry goods man, this morning closed a deal securing the large corner room at Madison and South Street now occupied by the American Racquet. He will have both floors, the second devoted exclusively to his ready-to-wear goods.

29 — The nearest thing Iola has had to a blizzard occurred last night as the winds averaged 30 to 35 miles an hour with falling snow. The United Iron Works north wall of the main foundry blew down, just missing D.T. Smith. Billboards on the north side of the square blew over and a large panel in the YMCA door was shattered. The Beatty implement company on the west side of the square suffered the greatest loss of window glass and the storm blew in the whole west end of the new brick Oakland school house three and one half miles south of Humboldt.

A strong anti-gambling race track bill has been introduced in the Kansas Legislature. The present laws permit gambling two weeks or more during the county fair season.

February

5 — Six business houses and their contents in the principal business section of Neosho Falls were destroyed by fire last night. The fire started in the kitchen of Bob Mitchell's restaurant and had gained considerable headway before it was discovered. The citizens formed a bucket brigade but were unable to gain control of the flames until the fire had almost burned itself out. In a town with a population of 700 a fire of this magnitude is crippling.

6 — The Supreme Court reversed the verdict of the district court here which found C.H. Wheaton guilty of fourth degree murder in the death of Maude Reilly last year because no evidence was presented to show where the alleged crime occurred.

Iola will have a canning factory with a capacity of 20,000 cans per day and in operation this coming season if contracts can be signed with farmers for 1000 acres of produce.

9 — The Chicago Lumber and Coal Co. today took possession of the property and business of the Foster Lumber Co. at Madison and Chestnut.

12 — Dr. A. Christian, county health officer, reports 16 cases of diptheria this year, 30 of scarlet fever, 63 of smallpox, 60 of typhoid fever and 30 of consumption. A noticeable fact is that there were no deaths from small pox this year. There were 15 deaths from consumption, nine from typhoid fever and one from scarlet fever.

15 — F.E. Smith has been named head of a committee of the Boosters to raise $500 for a building to house the new certain washing machine factory. The man in charge said they would definitely locate here if a building could be secured.

Sleighing parties are very popular this week due to the one and one-half inches of sleet that fell Sunday and Monday and the snow that followed.

19 — Fire consumed the S.H. Kress and Co. store and stock at 7-9 Jefferson Ave. and damaged the Eagle Building, the Klauman, Coffey and Brownfield and Davis buildings on that block. Total damage is estimated at $27,000. Kress' manager E.J. Schaffer said he did not know if the store would be rebuilt.

20 — Iola is to have a new ice plant. The company has closed a deal for the Star Brick plant site of 12 acres west of the Santa Fe switch. With the purchase the company acquires [illegible] McCarty Portland gas lease and [illegible] secured of fuel. Directors are [illegible] McCarty, W.S. Lyons, A.B. [illegible] dard, N.L. Vaste, E.J. Parmley, [illegible] Claiborne, W.G. Miller, W.H. [illegible] son, C.E. Woodruff, Grant Miller [illegible] Ira Kelly.

27 — T.J. Anderson, a director [illegible] the Middle West Portland Cement Co. which is erecting a plant north [illegible] Gas City, is in K.C. today attending [illegible] meeting of the directory during which the Union Portland Cement Co. will become the Middle West Cement Co.

March

2 — Kress will rebuild. Word was received in a letter today.

3 — Gov. Stubbs has signed the anti-cigarette bill and it will become operative tomorrow. Merchants who sell cigarettes or cigarette papers to a minor are liable to a jail sentence. A minor who smokes in the presence of any adult may go to jail and a person who allows a youth to smoke on his premises may go to jail.

3 — Herbert Ramp, superintendent of the foundries for the United Iron Works Co., is in Iola today and announced that the company would at once start a brass foundry in Iola.

Robert Atkinson, the canning factory promoter, is now out in the neighboring towns securing acreage. He has enough acreage in corn but not enough in tomatoes and other vegetables.

10 — The drowning of W.J. [illegible] with team in a ford in Carlyle township yesterday brought [illegible] fact that not every township in the county has water gauges placed at fords as provided by law. Mr. [illegible] who had a narrow escape.

The first of the spring hats are now on display in show windows. Because of the extreme width of the new styles, only four or five can be shown in a window.

11 — The Iola Construction Co. has been organized by Al Abrams, [illegible] Clifford, J.S. Walker and J. [illegible] Arnett.

D.B.D. Smelton, adjutant for the McCook Post, G.A.R., received the bill of lading today for the headstones for the dead veterans in the [illegible] cemeteries. It is hoped they will be in place by Decoration Day.

15 — The First Baptist Church was freed of debt yesterday when W. [illegible] Apple, the oldest member of the church and Olin Jordan, the youngest member, touched a match to the canceled note for $300.

19 — H.M. Cunningham and M. Becky, owners of the old courthouse building at Madison and Jefferson this afternoon purchased of [illegible] Klauman the frame two-story building adjoining the old courthouse. It will be removed and in its place a handsome two-story brick store and office building will be erected. Handsome office suites will be on the second floor.

22 — The machinery of the [illegible] Western Cement plant at Mildred was set into motion Friday and the institution is now running night and day. About 200 men are on the payroll.

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Work on the Lumberman's Portland at Carlyle is proceeding rapidly. A deal has also been closed whereby W.H. Kaol has purchased three lots of R.A. Edgar in Carlyle on which he will erect a hotel.

29 — Iola now has 14 miles of paved streets. When South Buckeye and South Walnut are completed there will be another mile.

The Horton Concrete Co. is now manufacturing a cement vault for burial purposes in addition to their cement blocks. The vaults weigh 1,800 pounds and sell for $50.

April

3 — The Republicans won a decisive victory in the local elections yesterday, carrying every ward. The total vote cast was only about 2,000.

Mrs. Temperance Hill, 80, dropped dead in Trinity Church last night immediately following her rendition of "Poor Home News" in a matrons' declamatory contest. The judges were allowed to report their decision despite the excitement over the tragic conclusion of the contest. Mrs. S.B. Knowles was awarded first prize and Mrs. Hill second.

14 — Tonight is the final rehearsal for Iolans who have practiced long and hard to present "Elijah" at the Grand Theatre tomorrow night.

The valuation in Allen County will be greatly in excess of last year despite the panic that discouraged business. Allen County has added two more cement plants, the Monarch at Humboldt and the Great Western at Mildred, in addition to other firms. Iola owes its increase to the Brownfield and Davis building and the John T. Woods buildings, among others.

The work of fitting up the Car Lock and Seal building near the Santa Fe for the canning factory will begin next week.

Tomorrow contractor C.C. Lacock will begin the work of excavating at the corner of Elm and Monroe preparatory to laying the foundation of a three-story building which will be occupied by the Iola Milling and Elevator Co. Seven thousand dollars worth of milling machinery has been ordered.

17 — One of the biggest foreclosure suits ever filed in Allen County was instituted this morning when the Trust Co. of America as a trustee began suit against the Lanyon Zinc Co. to foreclose a mortgage of $1,792,000 and to have a receiver appointed to take charge of the smelter interests. It will be remembered during the mass meeting of the smeltermen recently Mr. J.O. Rodgers, president of the Lanyon company, stated that conditions of past years had been against the company and that it had not paid its interest on the bonds in several years.

22 — Boosters listened to Dr. G.C. Glynn's proposal to attract new industries to Iola through the sale of cheap electric power. His report showed there is available electric power during the day and the city would be ahead to sell it at reduced rates to factories than to leave it unused, since it costs the city the same to produce whether used or unused.

Work was under way April 1, 1909 on the foundation and basement support walls and pillars. This view looks south and west from the alley east of the postoffice and The Manhattan Hotel is in the right background. The Cataract House was on the [illegible] corner of Walnut and West and there was a lumberyard across the street west.

The figures show Iola could make a profit selling power at 2 cents a kilowatt.

The formal opening of the C.C. Roberts Music Co. will be Saturday evening when Mr. Roberts will entertain the public with a musicale. His store is located at 7 East Madison.

Thomas Parker of McPherson has leased the Coffey building on the east side where the Coffey Furniture Co. was and will remodel the building to show moving pictures.

24 — The D&M Fuel Co. has just opened offices. W.R. Morse is president and H.V. Drenbach is secretary-treasurer. Their oil burner was perfected about three months ago and they have contracted with the United Iron Works of Iola to manufacture them. The burner is 9" wide and 4" deep and is similar in shape to the lid of an ordinary cook stove. The burner is placed in a stove simply by removing the lid of the stove and using the burner as a lid. The fuel oil flows from a tank through the burner into a small generator under the burner where it is converted to gas. The gas is mixed with 90 percent air as it is burned. One of these burners will produce intense heat in all parts of an average size cook stove. The company also manufactures a burner for heating stoves.

26 — Iola has come into possession of 1,000 acres of land controlling a new gas well west of the river. Two big wells have been drilled which measure well up into the millions. J.M. Rodgers, superintendent of the gas department, believes he will find enough gas there to place the gas supply beyond any doubt for many years to come.

The Lumbermens' Cement Co. at Carlyle is advertising for 60 to 80 more men. 120 are working at present. The eight dwelling houses and one boarding house are nearly complete.

Constantinople is enveloped in a terrible fire which is destroying the Christian quarter of the city and further efforts are being made to stamp out the Armenian population there.

May

3 — Allen County athletes took first place in the annual interscholastic track meet in Lawrence Saturday. Lambeth of Moran set a new record of 101 feet in the discus.

Mr. Chas. K. Taylor of the [illegible] Kansas Portland is responsible for bringing armory ball to Iola. It is similar to baseball but the bases are only 35 feet apart as opposed to 90 feet. The pitcher's box is 22 feet from home plate as opposed to 60 feet. The ball is three times larger and [illegible]. The pitcher must throw underhand and a team is made up of 10, there being two shortstops. The first game will be Saturday afternoon.

Twenty-one wolf scalps have been brought into the county clerk lately. Allen County must have an unusual number of wolves. Eight crow heads and two crow eggs were also brought in. The law provides for payment of 2 cents a crow head and 1 cent for an egg as of May 1.

In drilling on the J.H. Cline place in Geneva Township a five foot vein of coal was drilled through. Mr. Cline reports the coal is of good quality and hopes the Booster Club will look into the find.

5 — The appointment of a gas inspector has again come up before the county commissioners. It would be their responsibility to see that every well is plugged up properly. There is no doubt that gas is wasted and the fields weakened because the wells that have been pulled have not been plugged properly.

Mrs. Artie Heaton, who is charged with the murder of her divorced husband, Clinton Heaton, on July 5th last, is in confinement in an Iola hotel. The trial is set for May 18. While Mrs. Heaton's health is but little improved, she insists that the case be brought to trial this term.

Sheriff Bolling called the attention of the county commissioners to the fact there is no fire escape from the jury room on the fourth floor of the courthouse.

7 — It took but a moment of time last night to formally deliver the reins of government from the Democrats to the Republicans. The new mayor appointed the city officers including an entirely new police force. J.J. Creed was formerly assistant chief of police but the four patrolmen have never been on the force before.

The Iola Ladies Music club has come up with a splendid idea to extend the courtesy of membership to 100 associate members, which would entitle the associates eight tickets to concerts given by the members.

Prof. L.H. Wishard, principal of the high school, has been hired as superintendent of schools in Yates Center. He has been in Iola 11 years.

15 — Guy C. Taylor of the Our Way cafe is getting ready for the annual summer opening of the soda fountain on Tuesday.

19 — The case of the State vs. Artie Heaton began today. Capt. Ewing said the state would show that Mrs. [illegible] entered the Eagle [illegible] where [illegible] former husband was [illegible] [illegible]

[illegible] W.H. [illegible] of Leavenworth [illegible] high school [illegible]

[illegible] Haynes of [illegible] store at the [illegible] Washington [illegible] and will [illegible]

[illegible]

[illegible] Grand [illegible] Florence [illegible] Sawyer [illegible]

[illegible] United [illegible] head of a [illegible] ball league [illegible] bankers have [illegible] team and [illegible] printers. The [illegible] land has two [illegible]

28 — [illegible]

Laws [illegible] that [illegible] the national [illegible] which [illegible] not [illegible]

The [illegible] law means [illegible] under [illegible] employed, including [illegible] It further prohibits [illegible] of [illegible] the weights [illegible] instead of the [illegible]

29 — After being out for nearly 48 hours, the jurors in the Heaton case

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were unable to reach a verdict and were discharged.

June

1 — Memorial Sunday and Decoration Day were fittingly observed in Iola. Probably no similar occasion in the past has been marked by more earnestness, more tender homage, respect or remembrance. The Decoration Day parade from the square to the cemetery was headed by Robert's band, followed by Company M of the Kansas National Guard and the McCook Post of the G.A.R., the W.R.C. and hundreds of Sunday School children. The second division was head by the W.O.W. band followed by the Knights of Pythias and hundreds of people in carriages and motor cars. At the cemetery the unveiling of the monument took place and the servate dedicated the monument, placing it in the care and keeping of the McCook post. Mr. H.M. Miller made the [illegible] address.

Chief Creed is trying to define speeding in Iola. He can't see why it is that motorists will endanger the lives of pedestrians with rapid driving on Iola's 16 miles of paved streets. He has determined speeding to be over 12 miles per hour within two blocks of the square and 20 miles per hour outside this district.

4 — A large number of people attended the Catholic Fair last night. Some dancing was indulged in, refreshments were served and quite a number of fancy articles were sold.

According to the statistical report issued by State Labor Commissioner Johnson, Iola ranks seventh in the state in manufacturing industries, when number of employees on the payroll is concerned. Iola had 1,530 industrial employees. Other area cities: Coffeyville, 1,325; Independence, 1,069; Pittsburg, 3,350.

7 — A new factory slipped into Iola and nobody knew. It is the Edgar & Klaumann Metal Car Seal Company located at 208 S. Jefferson. It will manufacture the invention patented by W.K. Edgar, a metal car door seal.

10 — One hundred and thirty men operating five blocks in the Prime Western Smelter Company's number three plant in East Iola went out on a strike at 4 a.m. today and the entire plant is on dead fire today.

"The men want more money. We can't give it to them. That's all there is to it," said C.H. DeSaulins, superintendent for the company.

The Iola Chautauqua is off for this year. Hugh A. Orchard, the representative of the Redpath people who expect to put on the course, announced yesterday that not enough season tickets had been pledged.

14 — Smeltermen employed in the Prime Western Spelter Co. plant in Gas City ceased work this morning when the company failed to respond to a demand for a 10 percent increase in wages. In the neighborhood of 400 men are now idle.

16 — The first free band concert given in the downtown district by Robert's band last night attracted a large crowd. Long before the concert began on a platform erected at South Street and Madison Avenue the streets were thronged with people.

Two new businesses are now located on West Madison Ave. The Epiy-Ottinger Transfer and Storage company has located in the lower floor of the Odd Fellows Building and the Vacuum House Cleaning company is in the building adjoining, maintaining a stock of wallpaper in connection with the office.

17 — The city electrical department has recently installed additional electric lights in the boiler works at the United Iron Works plant. The boiler shop is now being operated day and night in an effort to catch up with orders.

18 — Iola placed herself in the ranks of the foremost cities of the country when the city council last night authorized an appropriation of $180 to assist in defraying the expenses of a series of 12 free public band concerts, to be given on Friday nights by the Iola Concert Band.

The city has stopped collecting the poll tax because the Legislature recently repealed a session law which gave cities of over 600 the power to levy the tax. A new law was passed providing for the poll tax but it was confined to cities of the third class.

22 — Twenty of the striking smeltermen bought tickets over the Missouri Pacific this morning for Pueblo, Colo., where they say they have secured employment in the smelters.

The Star Dome, the open air moving picture house which H.B. LeVan and Warren Holt are building on the north side, will open tomorrow night. Mrs. Edna Servey will sing the illustrated songs and Mr. Hoering will play the violin. Miss Genevieve Taylor of Gas City will officiate at the ticket window and Mr. Conley, of the Majestic, will receive the tickets at the door.

26 — A member of the strikers committee said the companies had told the men to come back to work and they would be given an answer to their request for a 10 percent increase in wages within three days. The offer was rejected.

29 — Smelters which have been idle since the strike of the workmen several weeks ago will resume operations next Thursday, July 1. An agreement has been reached whereby the men are to be given an advance just as soon as conditions warrant.

A carload of machinery for the canning factory at West Street and the Santa Fe Railway arrived yesterday and is ready to be installed in the building which has been remodeled for the packing plant. It is expected to have the plant in operation by July 15.

July

3 — The three-fold observance of Independence Day began this (Saturday) morning under the auspices of the Woodmen of the World will end Monday night when the last patriotic picture has been thrown upon the screen in the Electric Park auditorium. By that time enthusiastic Americans ought to have enough celebration to last them for a year.

ANNOUNCEMENT — With this date, The Iola Daily Register passes into the possession of "The Iola Register Publishing Company," a corporation which has also purchased the plant, subscription list and franchises of the Iola Record and the Iola Index. The last two named papers will suspend separate publication from this date.

7 — Just beginning its 25th year, the Iola Building and Loan Association elected as directors E.P. Brigham, T.M. Bartes, J.M. Williamson, J.K. Powell, Guy Penn, E.S. Slough, Frank Amerman, C.E. Perham, and M.O. Robinson. The officers are M.O. Robinson, president; T.M. Bartes, vice president, E.S. Slough, secretary; and Thomas Bowlus, treasurer.

8 — This issue contains a column full of hot weather tips.

9 — George Van Meter, son of Mr. and Mrs. Samuel Van Meter, of 508 N. Sycamore, died this morning from tetanus due to an injury received last Friday. He was celebrating the Fourth with a toy pistol. The wad from the blank cartridge was fired into the palm of his hand. Early yesterday morning tetanus, or lock jaw, developed which resulted in his death.

12 — Mrs. Lettie Kinman, the Gas City Central, will leave tomorrow for Kincaid, where she will spend a week's vacation. Miss Ida Kinman, her daughter, will be the "Hello Girl" during her absence.

13 — The pay scale at the smelters will be increased by 10 percent on Friday. This is the increase the workers asked for when they went on strike last month.

15 — The Neosho is flooding again and much damage to crops is resulting.

Armory ball, introduced in Iola several months ago, has taken such a hold that now there's got to be an armory ball league.

16 — News that the sheet rolling mill at Laneyville has started up will be pleasing to everyone in this district. The mill has not been operated for several years and when it shut down it threw quite a number of expert workmen out of employment.

17 — Roscoe Clark will enter the singles competition in the Kansas Open State Tennis tournament in Wichita Monday and Phil Glover will team with his partner, Doc Bowlus, in the doubles.

19 — The first car of Monarch Portland Cement was shipped from Humboldt Saturday to Wichita and Hutchinson. Their capacity is 1,000 barrels.

20 — Mr. and Mrs. J.B. Kirk, Master Victor and Stanley Kirk, will leave soon for a trip through the Ozarks in their Packard car. They will be gone several weeks.

The lights which have been placed at the four corners of the courthouse have won universal favor with the possible exception of the members of the Hand Holders' Union. The lights make a neat piece of furniture and illumine the park for a considerable distance. The castings were made by the United Iron Works.

There are 42 autos in Iola now. A list of the owners is published in this issue.

28 — There are 28 cemeteries [in] Allen County, which cover a tota[l of] about 104 acres.

Cement that cost $1.25 a barre[l] carload lots a week ago can be bou[ght] today for 80 cents. Wagon load[s of] this same quality, delivered, [are] quoted at 90 cents. A week ago [the] price was $1.50. The cement pla[nts] are in a war for markets.

29 — T.B. Shannon has just c[om]pleted the work of installing [an] underground tank for the storag[e of] gasoline at his store at the corne[r of] Jackson and Washington avenu[es]. This tank is connected with a s[elf] measuring pump inside the build[ing]. The pump is fitted with a measur[ing] device which registers the ex[act] quantity of gasoline which pas[ses] through the pump, thereby doi[ng] away with the use of the pint, qu[art] and gallon measures.

Dr. E.C. Reynolds, county hea[lth] officer, has begun the work of [in]specting the hotels and roomi[ng] houses of the city in compliance w[ith] an order from the state board [of] health.

The Register began a weekly pa[ge] of reports from the rural commun[i]ties surrounding Iola. This issue c[on]tained news from these commun[i]ties, most of which surrounded ru[ral] schools: Pleasant Valley, Souther[n] Salem, Deer Creek, West of the Ri[v]er, Wesley Chapel, District No. [illegible] Star District, Pleasant Valley Hi[ll], Onion Creek, Diamond, Star Valle[y], Belfry, Neosho Valley, Savonbu[rg], Prairie Rose, Crescent Valley, Silv[er] Leaf, Harmony, Geneva, Star Point, Carnahan and Wise.

30 — The local cigar makers uni[on] yesterday sent a vigorous protest [to] President Taft against the free i[m]portation of cigars from the Phili[p]pine islands.

August

2 — A bumper crop of 31 wheat ha[s] been harvested and 300 bushels of 7[illegible] cent corn are in prospect. Bank de[]posits equal $1 per capita. The asse[ss]ed valuation in Kansas amounts t[o] $2.5 billion. Industry is booming.

Frank Root, son of Mr. and Mr[s.] W.H. Root, won three of the six con[tes]tants he entered at the Chautauqu[a] assembly at Ottawa Thursday. H[e] won the gold medal in the high jump, silver medal in the shot put and th[e] bronze in the discus throw.

3 — The incorporators of the Iol[a] Register Publishing Company wer[e] Chas. F. Scott, L.L. Northrup, Ang[elo] Hunt, John Gushorn and F.W. Brewster. The officers are, Scott president; Hunt, vice president; secretary and treasurer, Brewster.

10 — Congressman Chas. F. Scot[t] expects to leave in about 10 days fo[r] the Hawaiian islands, where wit[h] other members of Congress he will b[e] a guest of the island government which is desirous that Uncle Sam shall know more intimately of th[e] needs and resources of the islands.

The new Kress building is com[]pleted and opening preparations ar[e] now taking place. The store will b[e] completely stocked for the opening day, Friday, August 20. A.J. Schaff[]ner is the local manager.

17 — New rules have been issue[d] by the Kansas National Guard t[illegible]

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cover sanitary precautions during the summer camp at Ft. Riley. Every man will be required to wash his face and hands before each meal. He will wash his feet and as much as possible of the covered portions of his body once daily and will take a bath at least once a week. His teeth will be brushed each day. The hair must be kept well trimmed. Finger and toe nails must be kept clean and well cut. Proper attention must be given to any corns existing.

13 — Teachers at the high school this fall will be, W.H. Carothers, principal; May Landis, mathematics; Annabel Paddock, English; W.L. Burdick, science; Lulu Grosh, Latin; Eugenie Sterling, history; Bernice French, German; Ruth Kennedy, history; Joseph Parks, manual training; and Margaret Herdman, domestic science and art.

14 — The new law prohibiting the use of the common drinking cup in the city schools is going to mean considerable expense to the districts. On account of the noise that would result from the 2,300 school children of Iola having a tin cup each, the board has abandoned the idea of the individual cup. A new scheme is being considered. It is to have jets at each school building behind which there is sufficient pressure to force the water out in a stream. The pupils could then put their mouths over the stream and drink without touching the jets. While no definite estimates are available, the committee expects that the system will cost several hundred dollars.

Iola's claim to cosmopolitanism has been strengthened by the addition of half a dozen Japanese, of which race this town has never before possessed a single resident. Nor has there ever been a Chinaman here. The Japanese are cement plant workers who will take places in the sacking room at the Iola Portland.

18 — Secretary F.D. Coburn yesterday issued his figures, taken from the returns of the county assessors, of the population of Kansas this year and he gives a gain over last year of 50,632, bringing the total to 1,701,491, which is the largest ever reported for the state. The population has gained almost 20 percent in the past 10 years.

20 — Otto V. Hough, city engineer, estimated it would cost $4,916 to extend city sewer services to the Highland Place area of Iola. A benefit district will be created to fund the project, which will serve 116 lots.

21 — As the Iola schools open on the 5th of next month many will like to know of the new Normal Course which will be offered. The course requires four years to complete. The regular high school diploma is issued on completion of the course, but in addition the graduate receives a certificate to teach.

Each graduate must pass an examination in reading, arithmetic, grammar and geography in addition to the examination in psychology and methods. These examinations are sent out by the State Board of Education and are graded by the same.

22 — "Judge Lease," the local favorite pacer, went around the fairground track without a driver in a record time of 2:12 yesterday afternoon. "Lease" broke the old record of 2:14 that he set himself last year.

This issue contains a long list of premiums to be donated by Iola business and professional men to the exhibitors who win ribbons at the fair. For example, Evans' Bros. will give $2.50 worth of books for the best peck of Tulpehocken apples.

The Iola schools will use the individual drinking cup after all. The board rejected the idea of installing water jets when it was discovered installation would cost $1,800 and might prove to be a failure.

27 — Robert Atkinson of Topeka, manager of a company which once said it would establish a canning factory in Iola, is in town. He said he would buy the tomatoes which his company contracted for at the beginning of the season when the canning factory was first discussed. But there will be no canning factory installed here. "We can't afford to put in a $6,000 plant here when there is nothing to pack. I expect to use the building for the purpose of packing a line of mustards," he said.

September

3 — Today or tomorrow it is expected to connect up the sections of the big gas pipeline of the Portland Gas and Pipeline Co. thus putting the finishing touches on one of the largest enterprises in Iola during the past year. The 16-inch line extends from Iola south to Independence and further to a few miles from the Oklahoma line. It has been handled entirely by a local concern of which Fred Horton has been the head.

According to Carl Newby, superintendent of the water department, thirty feet of the dam has been washed away and the remaining part of it is in a shaky condition. It is only a matter of time when, if something is not done, the whole works will topple over. The council is being asked to build a concrete cap for the dam and to put in gates to protect the city's water supply.

There are now some 1600 telephones in the local system — 1000 in Iola, 140 in Gas City and the remainder in the rural lines.

4 — The janitors of the different school buildings of the city are today fumigating the rooms preparatory to the opening of the term next week. The disinfectant used is formaldehyde and permanganate of potash which has been recommended by the state board. It is warranted to take hold of the pesky microbe and choke him to death.

Ethics are to be taught in the Kansas public schools. There will be no text book on the subject. The idea is to have the teachers teach ethics from the readers and from life. With ethics in the course of study it will be the duty of the teacher to point out to the pupils the morals in the stories they read and to make the moral points to be found in everyday events.

11 — The Iola Business College has started its 11th year of business with classes today. It had 130 pupils last year and indications are attendance will reach that level this year.

21 — Remember the mass meeting at the Skating Rink auditorium tonight at 8 p.m. The purpose is to explain in detail the nature of the factory proposition, the Shirt and Overall Factory, which a strong, operating and successful company wishes to establish here.

Deciding it was not advisable to take up the old walks leading from the four doors of the courthouse the county commissioners decided at a conference to advertise for bids for laying a cement walk over the old ones.

22 — The mass meeting last night was a hearty, spontaneous, enthusiastic success. The purposes were explained and subscriptions asked for and before the evening closed $10,000 had been raised. Only $5,000 additional is needed.

27 — No wonder there was an explosion at the Davis and Watson pool hall recently, resulting in a fire which caused considerable damage. This morning workmen took up the gas pipe and found it perforated in a number of places. The pipe was placed in a bed of retort and cinders and the acids from the cinders had evidently eaten through the pipe.

29 — The $15,000 is raised and Iola is to secure the Moller and Wheeler Shirt and Overall Factory.

The Register the other day devoted considerable space to a kick on the proposed parcel post, talked of for this country. Such a system, as proposed, would work directly for the benefit of the mail order houses and to the injury of the country dealers.

October

1 — Ray Kummings, the 10-year-old son of Phillip Kummings who lives near Moran, is recovering from the effects of serious burns he received from a powder explosion last Saturday night.

The Iola Industrial corporation stockholders met last night and elected this board of directors: L.L. Northrup, T.H. Bowlus, A.W. Beck, L.E. Horville, L.L. Pressler, F.D. Shields, J.D. Arnett, C.E. Newton, W.J. Evans, T.M. Bartels, J.F. Goshorn, T.B. Shannon, Leo Manzengale, Frank Wood and M. Schoenbrun.

5 — At a meeting of the directors of the Industrial corporation last night it was decided to purchase the Northrup site just east of the Northrup lumber yard as a location for the shirt and overall factory.

7 — Thirty-five employees of the Iola Rug Factory are idle today and the McCarty machine shops are without power because of a fire which early this morning destroyed the engine room of the machine shops, wrecked the rug factory rooms and burned the equipment and a large part of the stock. The combined loss of Mr. McCarty and Mr. Feust, owner of the rug factory, is estimated at $8,000. The buildings are located on Broadway and South Streets.

The skating rink will be open tonight for the last time until about the middle of November as it has been rented to the ministers of the city for revivals.

8 — Next week the Farmers' Institute will be held in Iola. The program provided is of a most interesting and profitable nature and the speakers who will discuss live topics are in several cases specialists of nationwide reputation.

An injunction suit has almost crept upon the city, as the councilmen learned last night when Dr. E.C. Reynolds, county health officer, told the council of complaints lodged with him against the practice of dumping the city garbage on Rock Creek at the end of South Kentucky street. The council turned the matter over to its street and alley committee with instructions to find another dumping place. The council also decided to ban hypnosis shows and to make it a misdemeanor to hypnotize anyone under the age of 21.

12 — Engineer W.R. Crangle was killed at the Iola Portland Cement plant today when he became entangled in a belt and was whipped and whirled over the line shaft.

16 — C.A. Mitchell of Lawrence, a good friend and supporter of Gov. Stubbs, today announced he would seek the Republican nomination for Congress from the Second District against incumbent Rep. Charles F. Scott.

18 — Tomorrow being the anniversary of the surrender of Cornwallis in 1781, the WRC and GAR of the city will observe it as a patriotic day by decorating their hall and homes with flags. The KNG and similar organizations are requested to make a like observance of the day.

21 — Fryer Bros. have put on an extra delivery wagon to haul bread, meat and other eatables to the pipeline gangs west of the city. The Kansas Natural is building a third line to Kansas City, the new line to run parallel to the others. It has two gangs west of town, one about one and one-half miles north of the west street road, the other about the same distance south. There are about 375 men, mostly Greeks, with the two gangs. It requires an average of 150 two-pound loaves of bread and three quarters of a beef to feed the men.

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22 — The thought trend of the council meeting last night centered about the advisability of testing all gas pipes around the business section of the city. Ever since the explosion on the east side which came near resulting in a disastrous fire, there has been talk of taking some steps to do away with the cause.

28 — The Humboldt refinery is running night and day now to keep up with the orders. The company makes a good grade of oil and also sells large quantities of fuel oil.

At a meeting of the Humboldt township board yesterday it was decided to build another mile of macadam road. When this mile is completed there will be only four and one-half miles between Humboldt and Iola without the macadam.

29 — Iola is to have a football team. An effort will be made to secure the services of [illegible] Garrels, for three years star and fullback with Coach Yost's Michigan gridiron warriors, as coach and fullback. With Prentice Donald, perhaps the best tackle Kansas University ever turned out, playing regularly the line will be stronger than ever. A meeting of players for the purpose of perfecting an organization has been called for 3 p.m. Sunday at the Iola Electric Park.

30 — The Taylor-Holeman Gas Co. of Moran, which has been providing natural gas to that city, has notified its customers that it will stop selling gas on November 30 due to the lack of natural gas in the area. The town is preparing to go back to the use of coal and oil for fuel.

November

2 — An agent for the Great Western Cement Company at Mildred was in the city last evening trying to get laborers. He did not say how many could be used.

3 — A.W. Howland, who came to Allen County in 1859 and moved to Iola in 1888, died today. He was a farmer and former county commissioner and the courthouse became a monument to his energy and a source of pride to him as superintendent of its construction.

6 — W.H. Wheat, superintendent of the construction work on the new post office building, said today that he expected to hoist the flagpole on the structure next Tuesday. The progress on the roof will be far enough along at this time to place the pole permanently.

The *Register's* LaHarpe correspondent today makes mention of the fact that Mr. Ezra Carpenter of Iowa is making plans to develop coal southeast of LaHarpe. The important possibilities of this move are so great that the entire county should feel an interest in the transaction and a willingness to aid and encourage it.

Mr. and Mrs. L. Krupp celebrated the fifth birthday of their son, John, yesterday afternoon.

8 — In an opinion rendered Saturday the Kansas Supreme Court practically knocked out the poll tax ordinance passed by the city council last spring. The city will refund the $3 taxes paid thus far by the citizens.

Steel beams were used [illegible] the heavy [illegible] tile that [illegible] first federal building built in Iola. This picture was taken July 1, 190[illegible].

17 — Notice to the people of Iola: Every ounce of gas we have is turned on today. The city officials have done everything in their power to relieve conditions. So far they have no assurance that they can receive gas from pipeline companies. I make this statement because the people are entitled to know the truth. My suggestion to the citizens of Iola is that they prepare at once to use other fuel than gas this winter — H.F. Travis, Mayor.

18 — George E. Nicholson, president of the United Kansas Portland Cement Co. has arranged for the city gas department to be connected with the Portland gas pipeline to assure a supply of fuel for the winter.

19 — At the meeting of the council last night the city attorney and the judiciary committee were instructed to draft an ordinance requiring the installation of meters for all gas services in Iola. This step was taken that the committee, appointed to confer with pipeline companies relative to securing gas, may be able to talk business. It is known that companies will not even listen to an application for gas unless the city is on a meter basis. An ordinance requiring a testing of all gas pipes in the city was also passed last night.

Tom Mix, a cow puncher of the old school, who looks the part naturally, who has traveled with the 101 Wild West show and who has done considerable work for the cement companies was in Iola today, calling on Leigh Hunt and other friends.

20 — Ira Kelley, proprietor of the Kelley Hotel on South Washington Avenue, will enlarge his hotel by adding a third story. This would give him a double set of rooms on the third floor.

22 — During the night another cold spell came on with the temperature falling to freezing and staying there. The gas pressure was again insufficient, the city not yet having connected up with the Portland Pipeline Co. It looks very much like about three quarters of a mile of pipe will have to be laid before the connection can be made.

23 — Dec. 31 is the last day the flat rate for gas will be in effect in Iola. The committee has sent in an order for 1,300 meters from the Meteric Metallic Company of Erie, Penn.

24 — Thanksgiving Day will be observed generally and appropriately in Iola. Practically all of the business houses will be closed in the afternoon and many all day.

By next Monday none of the school houses of the city will be using gas. A number of the buildings are now on coal and the others are making the gas disconnections as rapidly as possible. One laundry is also using coal and the other will be very soon. The Iola Ice and Cold Storage company is making preparations to install oil burners. All of this means that there will be considerably more gas shortly for private families.

27 — Two big meetings, at which out-of-town speakers will deliver addresses on the commission form of government, will be held here next month.

The colored people will have the skating rink again next Monday night as they have shown that they are sufficiently interested in roller skating to make it pay the management to give them one night a week.

December

4 — Jimmie Frick, third baseman for the Toronto Eastern League baseball team, and some others are organizing to play the United Kansas Portland next Wednesday night at the Auditorium. Indoor baseball has never been played in Iola and the novelty of it should be an attraction. In all of the larger cities the game is played throughout the winter.

6 — To tide the city over until the permanent connection with the Portland pipeline is made, the municipal officials made arrangements this morning to connect with the Iola Portland's 12 inch line near the Mineral Well.

9 — The county commissioners granted the application of a number of farmers for a charter for a drainage association. The election judges and clerks named to conduct an election for the new district are A.L. Townsend, J. Hall and J.H. Bendenbender, judges, and Ira Townsend and Earl C. Munfort, clerks.

The Allen County gas field that now shows signs of giving out holds a record for production the like of which no living man will probably ever see again. It developed into an area of 34 square miles. Gas has been used from it for eight years, but the maximum consumption may be conservatively said to have endured for [illegible] years. The demand made by the [illegible] cement plants, and brick [illegible] up to an estimated 45 [illegible] feet daily. Add the consum[illegible] towns and the minor indu[illegible] and 10 millions [illegible]. In other words, [illegible] turned out 50 million cubic feet [illegible] five years.

16 — A very [illegible] occurred in the [illegible] early this morning [illegible] including the post [illegible] destroyed and a fifth [illegible] damaged. The fire was [illegible] O.D. McOwen bea[illegible] restaurant. Also destroyed w[illegible] Roberts meat market and [illegible] real estate building. The West Hotel, a brick building, was badly damaged, mostly by water, but the fire department was able to halt the [illegible] at that point.

17 — When the meter system goes into effect January 1st you will pay at the rate of 20 cents per thousand cubic feet for gas. An ordinance was passed at the meeting of the council last night fixing this rate.

Glen Lawyer and Ray Enfield will represent the Iola High School in the annual debate with the Ft. Scott High School team.

21 — Late yesterday afternoon Judge Oscar Foust appointed Police Judge Wallace H. Anderson receiver for the Petrolia Refining Co. The refinery was built by Mike Miller and others about five years ago.

County Attorney H.A. Ewing, Sheriff C.O. Bollinger and Undersheriff A.L. Boatright visited all the cigar stores last night that were known to them to handle slot machines in selling cigars and told them the practice was in violation of the law. The proprietors consented to quit and began at once to move the machines out.

24 — Tonight at practically all the churches in Iola arrangements have been made to have Santa Claus make a visit. He will come to see the children, not the grownups, and no grownup can hope to hold his slightest attention, nor to get the faintest sense of the joy of the annual meeting, unless he gets up on the mourner's bench from which he can look into the faces of the little folks. There he will see written the hope and faith that moves worlds.

28 — Mr. and Mrs. Grant Miller have sold their photographic studio and gallery to Art Gibson. The Millers have conducted the gallery here for 12 years. Gibson has been employed at the gallery for nine years.

31 — The most elaborate event of the week just closing will occur tonight in the Elks' Club rooms when the annual dance is given to celebrate the coming of the New Year.

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1910

January

By 5 p.m. today 2,000 applications for gas meters are expected to be on file at the city clerk's office. At midnight Friday, the first day of the new year, the flat rate for gas service in Iola stopped and the meter system went into effect.

LAHARPE — A 3,000,000 gasser was brought in late Saturday on the Donnan farm east of town for the east smelters . . . as soon as the gas is connected with the smelters, fires will be started in the furnaces and work will begin immediately . . . only men living or boarding in this city will be allowed to work at the smelters. This is done in order to boost the town and no doubt is a good plan.

5 — The short term in the county schools is going out of style. A few years ago a large number of the Allen County schools had but six-month terms, now only six do. There are 44 seven-month schools, 26 schools will have eight-month terms and five will have a nine-month term.

This issue contains a chart giving weather data for Iola covering the years 1868 through 1909. The average rainfall for those 41 years was 36.92 inches. The wettest year was 1905 with 48.52 inches; the driest was 1882 — the year that Charles F. Scott bought *The Register* — with 27.60 inches recorded. Temperatures as high as 108 and as low as minus 24.5 were recorded.

6 — GAS CITY — Yesterday afternoon the burners from two of the furnaces of the school house were removed and coal burned the remainder of the day. In the future in two of the furnaces they will burn coal and in the other two gas will be used.

The Suffragette movement is upon us. Not the hypothetical overseas movement that has had the lords ducking, but a home-made epidemic that will be shoved right up to the men of Iola, of Allen County and of the state of Kansas to decide.

12 — In another column of this issue appears a call for bids for drilling a well in the court yard. The commissioners took the action because of the high cost of heating the court house. In December, 642,000 cubic feet of gas were consumed . . . a small well would easily supply the courthouse with all the gas it would need.

18 — Police Chief John Creed served notice on J. W. Coffey, receiver for the Parkola theater, this afternoon not to permit Emmett Dalton to give his moving picture show here tonight . . . it seems information had been sent here from Chanute that the show was "immoral" and tended to have an evil influence on boys . . . A Chanute informant told the *Register* that the only scene that could be considered immoral was the film showing the attack of the Dalton gang on the Coffeyville bank.

20 — Mrs. Lucretia Campbell, Humboldt, the district manager of the Suffragettes, wrote again in favor of giving the women the vote in Kansas and complained that the editor of the *Register* had not taken the cause seriously.

GAS CITY — A number from here last evening attended the dance given at the skating rink in Iola. This was the first dance given by the Iola, LaHarpe and Gas City Dancing Club. A good time was had and another dance will be given February 4.

26 — At the public meeting called to challenge the city's right to require gas meters it was decided to raise $600 by public subscription to pay lawyers to conduct the case.

Iola High School has a spring semester enrollment of 303, the greatest number in its history. According to state reports there are only six high schools in the state that are larger than ours and one of those (Sumner County) is a county high school. The cities having larger schools are Kansas City, Topeka, Lawrence, Wichita and Pittsburg.

28 — Ernest Miller, the young Emporian who Miss Pearl Thompson of East Iola charges with being the father of her illegitimate child, has not yet been able to give a bond of $500 and is still in jail.

February

1 — A circular has been issued by the post office department prohibiting the killing of rabbits by rural route carriers. The circular order also prohibits the carrier from killing all kinds of game while on duty. This comes, too, when prices of all kinds of meat are away up in the clouds.

Al Abrams, poor commissioner for Allen County, in his annual report showed that he paid out in aiding the county $1,217.89 over the county during 1909. His report shows that the farm not only supported itself but really increased in value during the year.

3 — President J.O. Rodgers of the Lanyon Zinc Co. has announced that two blocks of the No. 1 works will be put back into operation. The works have been idle for over a year, ever since the panic landed a solar plexus blow on the smelter industry by leaving the zinc men with $30 ore on their hands and a nominal price for spelter . . . the idle factory northwest of Iola has been a monument unto better days in the eye of the public.

5 — A suit has been filed asking the court to enjoin the city from enforcing the ordinance requiring gas meters.

The Iola YMCA basketball team beat the Cherryvale Athletic Club 37-36 to become the champions of Kansas last night . . . the crowd of 300 people — the largest that ever attended a basketball game at the local YMCA — was kept at a high pitch of excitement throughout the game.

7 — According to the 1910 newspaper directory, the newspapers of Kansas consist of 12 daily, 646 weekly, two tri-weekly and nine semi-weekly . . . The *Register* ranks 13th among the dailies in circulation, with 3,130.

JOPLIN — According to the Joplin *Globe*, the bondholders have taken control of the Cockerill Zinc Company and will operate its plants. The bond holders are the National Bank of Commerce at St. Louis and George E. Nicholson of Kansas City . . . Cockerill owns smelting plants in Altoona, Bruce, Gas City, LaHarpe, Pittsburg and Nevada, Mo. The bonds outstanding amount to $1,200,000. At the present time the company is only operating two blocks of its Altoona plant and its Gas City plant to full capacity . . . The recession, a scarcity of ore and the tariff on imported ore are blamed for the failure of the company, which is one of the largest zinc smelting companies in the world . . . The nearest competitor as far as the number of retorts were concerned, was the Lanyon Zinc company, which also went into the hands of a receiver last year during the fight for a tariff on zinc ore . . . it is only the gas-fired smelters that have been kept in operation since the panic of 1907.

9 — The commissioners are not very hopeful that gas will be found in a paying quantity in the well now being drilled in the court yard. Gas sand was reached last night and a little gas was found. There is considerable water in the sand and the drillers say that unless a stronger pressure is found, the well will not be worth connecting up . . . The depth of the well this afternoon at 2 p.m. was about 860.

10 — A public invitation was issued to attend a Factory Ball to see the Dress and Overall Factory built on West Madison by the Iola Industrial Company, a group of businessmen who built the building to create jobs to help fill the void left by the dying zinc smelters.

11 — A report on the annual meeting of the Globe Shoe and Clothing Co. noted that there were stores in Pittsburg, Iola, Oklahoma City, and Cherryvale and that the capital of the company had been increased from $100,000 to $175,000 to finance the stores at Cherryvale and Oklahoma City. A.H. Schlanger was president, Julius Schlanger, vice-president, Jos. Schlanger, secretary and Louis Schlanger, treasurer. Louis was the manager of the Iola store.

16 — A crowd of about 500 came to dedicate the Booster Building.

21 — Col. Herbert Johnson, the auctioneer, reports that a half dozen of the fine animals in two mule sales were sold at the Paul Blair sale eight miles northwest of Chanute yesterday for nearly $1,400. That is an average of about $235 a head.

22 — A judgment for $3,464,660 and an order of foreclosure was granted to the Trust Company of America against the Lanyon Zinc Company by Judge Oscar Foust this morning. The property of the company was also ordered sold to pay the indebtedness . . . The history of the Lanyon Zinc company's case is familiar to most. The company is the result of a union of the gas lands and wells of the Palmer Oil and Gas company and the smelters of the Lanyon family northwest of Iola. Bonds were sold and a large plant and rolling mill erected at LaHarpe.

25 — A considerable consignment of the Carthage stone required to complete the federal building has arrived and it now seems that the building should be rapidly completed. This stone is for use inside and the delay in getting it according to contract has delayed the building a month.

25 — The Parkola theater on the east side of the square has been sold to Wichita men who will take charge of the place a week from tomorrow and conduct it as a moving picture theater.

March

1 — The number of voters in Iola qualified to vote on the adoption of the commission form of government on March 10 is 2373. The registration books closed at 10 p.m. Saturday.

5 — The total amount of sales in realty for the week ending last night reached $180,297, breaking the record for the year. The daily average was $25,760, or as large as that for some entire weeks. There were 58 transfers according to Frank Wood, manager of the Iola Abstract Co., which furnishes the figures, making them average about $3,100 each.

The *Register* was told this morning that the charter for the proposed bank at Piqua has been granted and is expected here in a few days. The Iola State Bank is credited with being behind the organization of the new bank.

7 — John Percy who has had charge of the poor farm for the past two years was down today to get a load of flour at the Humboldt Water Mills. John has made the poor farm a paying proposition. He not only keeps the dozen or 15 who don't have to worry about the high price of living, but he also turns over a respectable sum to the county after all expenses are paid.

11 — Sweeping every ward in the city, the commission form of government carried in Iola yesterday by a majority of about 213. The voting was very light, however, only about 927, or less than half of the registration, being cast. Of the number, 570 were cast for the new plan.

12 — The Williams Marble and Granite works on south Washington has just completed the installation of a piece of machinery for compressing air. The machinery is run by an electric motor. C.E. Williams, manager, said business has increased 100 percent in the last two years.

14 — The business section of Bronson was almost completely wiped out of existence last night by a fire which started in some unknown way in the building on the east side of Main Street occupied by the Goodno Hardware store and Jess Ford's restaurant. Before the fire burned out, most of the business section on both sides of the main street was in ruins. Among the firms which were burned were the Bronson Hotel, Ford's and Goodno's, Joe McKeehan's barber shop, Anderson and Son real estate, the Bronson post office, the Love Millinery store, the Bronson Meat Market, the Morris Billiard Hall, Wright Ireland general merchandise, the Bronson telephone exchange, Geyer and Osborne hardware, the town lodge hall, Holt and Bowers meat market, the Spencer restaurant, Holeman Bros. gas office, Moore's Jewelry, Webster Harness shop, the Dr. J.S. Cummings drug store, and several other offices.

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15 — For miles about Carlyle one can see the stacks of the Lumberman's Portland Cement Company, four of which are now in place.

Iola is very much interested in the solution of the cement problem — low market prices — as the two plants here give employment today to 1,000 men, which means that between a third and half of the population of this town is dependent on them for a livelihood.

17 — A quarter million gasser was drilled in at the jail yard last night by the Gas City drilling co. The well was drilled as the result of a deal between the county commissioners and C.E. Newton, proprietor of the Iola Steam Laundry. Under the deal the county gets first call on the gas for the jail, after which Mr. Newton comes in for gas for his laundry.

23 — W.B. Cain and Walter Redfern have bought out the barber shop of E.I. Kelsey on 11 East Madison.

23 — A meeting of the tennis club is to be called soon to perfect the organization. Thirty-five names have been signed to a paper agreeing to help bear the expense of grading the court and building the club house.

April

2 — The Western Cement plant at Mildred will add two new kilns to make four and will double its capacity as well as its payroll.

4 — The Wheeler & Motter Shirt and Overall Factory of this city began turning out its product this morning. When J.B. Kersey, the manager, went down to open up, he found about 50 or 60 women waiting to go to work, although he had announced that only 8 or 10 would be given machines today.

6 — Gaylord M. Robinson, Frank E. Smith and Dr. G.C. Glynn were elected as the first Iola City Commission. Robinson was elected mayor.

Word has reached here that the material for the new $6,000 Katy depot for Mildred has arrived and that work on the structure will begin at once.

6 — Every pupil on the townsite is looking forward to tomorrow night, the occasion being the fourth annual literary contest between the high schools of Iola and Ft. Scott. Practically every seat in the Grand Theatre has been taken. Ft. Scott will come over tomorrow afternoon by special train, the delegation including several hundred school children, teachers and citizens.

9 — In the literary contest between students of Ft. Scott and Iola high schools there were five events; essays, declamations, quartettes, orations and debates. Ft. Scott took the first two and Iola took the rest, scoring five points out of a total of seven.

13 — The Farmers State Bank of Piqua was opened this morning. A fine new brick building will soon be built as a permanent home. J.W. Grogman is president; George Wille is vice president; John H. Wille is cashier; and the directors are J.H. Campbell, L.E. Horville, W.S. Kaufman, all of Iola, J.W. Grogman and George Wille.

15 — J.M. Jackson, who will manage the new nursery north of the city, received a consignment of plants from Ottawa yesterday and with a force of men began planting them today. The consignment consists of 10,000 California privet, 5,000 evergreens, 15,000 grapes and 4,000 rose bushes. In a few days a shipment of trees will come in.

19 — A large and enthusiastic crowd of citizens of Piqua and surrounding country assembled in the CMBA hall Saturday evening to assist in organizing the Piqua State Bank. The directors are L.C. Niemann, Antone Diebolt, John Diebolt, Lawrence Diebolt and Antone Diebolt Jr. The officers will be selected at an early meeting of the directors.

21 — The supreme lodge of the Benevolent Order of the Good Shepherd was granted corporation papers for the avowed object of organizing the spread of the gospel of the fatherhood of God and the brotherhood of man. Sidney Handley, George Bell, Brock Lane, Jerry Keith and Christopher Jones, all of Iola, are the incorporators.

26 — To get back to the sane Fourth, to teach the young the true meaning of the day and to impress on the foreigner that it has a patriotic significance — this is the purpose of a movement which the Mothers' Club of Iola will formally launch at a meeting tomorrow afternoon. The Mothers' Club is the outgrowth of the work of Little Builders' Chapel. It meets every Wednesday afternoon and renders a program in which matters pertaining to the proper development and the protection of the child are discussed.

27 — The following city officers were named by the first Iola city commission: L.E. Oxford, city marshal; Trevis Morse, city attorney; T.F. Ziegler, city clerk; Vere D. Fry, city engineer; T.H. Bowlus, city treasurer; Joe McCarty, fire chief; and W.T. Smith, police judge. In order to cut city expenses, the salaries paid were reduced in some cases and some offices have been abolished, so that officers' salaries have been reduced from $855 a month to $470 a month.

28 — Manager Kersey of the Wheeler and Motter Shirt and Overall Factory expects to have 150 machines running by May 1. He was running 26 machines up until a day or so ago when a few of the girls had to be laid off. Normal conditions will be restored in a few days.

Sunday Iolans will get their mail at the new federal building. Postmaster C.B. Spencer said this morning that although the furniture in the new building is not yet arranged, yet he considers it best to move in at once.

30 — Tonight the post office employees will officiate at the removal of the ancient and honored remains of post office equipment of Iola to their last resting place. In other words, Uncle Sam will after today provide his own house for his office and barring destruction by the elements, this is the last move. At 2:30 tomorrow afternoon the public will be admitted for the first time to the handsome federal building on West Street at the corner of Walnut and will receive mail from the new building hereafter. The first post office in the area was located at Cofachique, which was built southeast of the present city on the Seth Bartlett farm. Henry Linn was the first postmaster and his term indicates that the office was organized about 1856. In October 1859, largely by reason of the fact that Cofachique could get no good water supply, the town was abandoned and the office moved to Iola.

When first moved here the equipment was placed in a log building on the west side of the square about where the Barclay-Shields store now stands. James Faulkner moved it to the New York Store corner. Under William Newbury, a lieutenant in the army, it was moved to several locations and then back to the Barclay-Shields site. S.J. Cowan built a frame building on the corner just north of the Pennsylvania Hotel and the office remained there during his term. Then a move was made to the John Vannaya Building where the Shields Shoe store now is and from there to the Robinson building where the Mumma store now is located. From there it jumped the square to the Sleeper building at the northwest corner and the move tonight will be from the Sleeper building to the federal building.

The postmasters who have served are: Henry W. Linn, Henry D. Parsons, Aaron Chase, James Faulkner, William Newbury, Jacob Carnter, Samuel J. Cowan, Cyrus Simpson, John Ireland, William McClure, John Ireland, Henry Henderson and Charles B. Spencer.

May

4 — Perham & Son, a clothing store, have dissolved partnership, L.W. Perham, the senior member, retiring. The business will be continued by Mr. C.E. Perham.

17 — The Cockerill zinc properties of Allen County were sold at a sheriff's sale today for $150,000 to the holders of the notes against the property. Sold were the zinc smelter at LaHarpe, originally called the Brown Smelter, and the Cockerill Zinc works at Gas City, an extensive smelting works. With them went pipelines, gas holdings and all the equipment of all kinds used in operating the plants.

The program of the state association of the BPOE was formally opened at 2:30 p.m. when about 200 Elks piled into street cars and started on a sightseeing tour of the cement plants, smelters and factories on the car line. This promises to be one of the most successful state meetings ever held by the Elks.

20 — Marshal Jim Frederickson of Bassett was acquitted last evening of the murder of Wm. Cooper, alias A.G. Turney. The arguments closed about 4:30 p.m. and the verdict was delivered 20 minutes later. Cooper was shot by Frederickson when the marshall attempted to arrest him last June on a charge of carrying concealed weapons and Cooper resisted arrest.

22 — The census just completed shows a population of 27,931 for Allen County, a decrease of 425 over last year. Iola went from 9,648 to 9,271. The population of the other cities were: Humboldt, 2,609; LaHarpe, 2,306; Gas, 1,320; Moran, 563; Bassett, 414; Mildred, 413; Savonburg, 231; Elsmore, 224; Petrolia, 191 and Carlyle, 170.

28 — The plant of the Iola Packing Company about a quarter of a mile west of the city limits on the West street road caught fire this morning and within an hour the building and its contents were completely destroyed, entailing a loss of at least $15,000. The company is managed by Otto Hinze. He did not say this afternoon whether the plant would be rebuilt.

26 — The Iola High School commencement exercises will occur tomorrow night in the Grand Theatre. There are 32 in the class this year, an increase of 3 over 1909. An admission of 25 cents will be charged at the exercises. The graduating seniors are: Beulah Pearl Butler, Paul Edward Boucher, Mary Adaline Brigham, Hazel Lorena Butcher, Katharine Viola Dennis, Mary Edna Eakin, Harrison Elrod Fishbaugh, Dorothy Vernon Foust, Gladys Arletta Frank, Norma Leona Gardner, Eunice Ellen Jackson, Wynona May Jones, Louise Hazel Knake, Myrtle Knowlton, Margaret Annice Lang, Elmer Julius Lawyer, Glenn Henderson Lawyer, Donald Lowell Lowdermilk, Bessie Fay Mercer, Dena Opal Monden, Lillie McCarty, Alfred Kibler Nelson, Della Reilly, Florence Anna Reid, Florence Roy Round, Leila Cox Shadwick, Velma M. Sleeper, Julia Alice Smith, Alta Roy Tanner, Grace Evangeline Thompson, Irma Thompson and Alpha Marie Walters.

June

1 — Charles F. Scott will open his campaign for Republican renomination for Congress Saturday night in the Portsmouth Auditorium at Kansas City, Kans.

10 — The police office is being moved today from the city hall to the room which has been occupied by the street commissioner on South Street, just north of the fire department. The street commissioner will move to the old police office in the city hall.

15 — If the county commissioners do not raise the assessment on farm land in Allen County, the probability is that a protest will be made to the state tax commission. Late yesterday afternoon, John Henderson, H.L. Henderson and one or two others appeared before the board in an effort to convince that body that farms had been assessed too low. Their contention is that land should be listed from 30 to 40 percent more than it is. The law says that all property shall be assessed at its actual value in cash.

16 — At the regular monthly meeting of the Allen County Medical Society in the rest room at the courthouse last night a committee was appointed to investigate and suppress so far as was in their power the promiscuous prescribing and dispensing of narcotic drugs. The committee consists of three physicians, Drs. Heylmun, Mitchell and Lodge.

The object particularly aimed at in

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the appointment of the committee was to secure the cooperation of the physicians and druggists to stop the sale of cocaine.

28 — The plant of the Iola Packing Company about a quarter of a mile west of the city limits on the West street road caught fire this morning and within an hour the building and its contents were completely destroyed, entailing a loss of at least $15,000. The company is managed by Otto Hinze. He did not say this afternoon whether the plant would be rebuilt.

Miss Flossie Lamberton had the following girls as her guests yesterday for a thimble party: Misses Marguerite Wolfe, Hazel Drake, Edna Klein, Ruth Horton, May Brigham, Dorothy Foust, and an out-of-town visitor.

27 — Mrs. Arlie Heaton entered a plead guilty to manslaughter in the fourth degree in the shooting death of her husband and the plea was agreed to by the court.

30 — Two July 4 celebrations will be held in Iola this year, one to be given at Electric park under the auspices of the Iola band and the other at Riverside Park by a committee of citizens headed by Col. Charles S. and Ralph Bishop.

"Henley" Clothes
If you want the most stylish suit you ever saw, buy a "Henley" suit.

The Barclay-Shields Clothing Co.
The House of Quality

July

An Iola man who visited the Lumberman's Portland Cement Plant at Carlyle yesterday says that the company now has hopes of being able to burn clinker within six weeks. The plant is being erected north of Carlyle and construction work has been going on for many months, but the first work was centered on the brick plant. A brick plant of large capacity was finished and has been making brick for some time, which was a decided aid in the cement plant construction. When the plant is running, it will be the 5th operating cement plant in this county. The Lehigh properties north of Concordia and the Hercules Portland at Humboldt are in various stages of progress.

2 — An automobile garage and auto agency is a building 60 by 100 feet on West street in the newest development of the lower white way. It has fallen a victim to E. P. Fuller is the man behind the scheme and he has started work already on the building. It is located at the corner of West and Chestnut streets and will face north on west. At present Fuller is local agent for the White Steamer cars only and will carry a line of these for immediate delivery.

6 — In the near future the firm of Brownfield, Davis and Sifers will add another story to their already spacious building at the corner of Sycamore and Madison occupied by their candy factory. The building is 40 by 100. It was built two years ago. The firm of Brownfield & Davis was first established here some years ago on the east side of the square. Some time ago Mr. Sifers purchased an interest and the firm was given its present name.

15 — Ed Ault, who is employed at the McCarty Buggy & Carriage Works, on South Street, has almost completed a biplane, the idea and construction of which he has been working on for about three years past.

The open season for plovers will begin July 15.

16 — School District No. 10 which includes Iola made a slight gain in children of school age during the past year. Prof. C. V. Dennis who took the school census, announced his figures today. His report shows 3,036 people between the ages of 5 and 21. Last year 3007 were found. Of these, 2,756 were white and 250 were colored; there were 1,587 girls and 1,449 boys.

23 — Found in the local items: We had sooner see a girl kiss a blind shoat through a barb wire fence than have her change partners six nights in the week in the front parlor with the lights turned low. It is much harder to marry off a girl who has been pawed over by every cap in the community than it is to fatten a shoat on pineapple rot. You can't gild brick a sharp-eyed caller with secondhand goods any more than you can with a bathrobe on a goat. There's lots of weak-minded parents who are going up against the city with about as much show as a trousseau girl at a beauty show and their children will rise up and call them names with about as much enthusiasm as a one-legged man at a cakewalk.

25 — If you walked up to the water tank in the courthouse today expecting to refresh yourself with a few swallows of ice cold water you were disappointed unless you had your individual drinking cup with you. Saturday Chief of police Gutfield caused the common cup at the fountain to be removed. Janitor Crumley then followed suit at the courthouse. The common drinking cup is in violation of the rules of the state board of health.

27 — An explosion at the Kansas Portland Cement plant at Concrete yesterday afternoon fatally injured chemist Merlin Boye of Iola and severely injured four others, two of whom may also have received fatal injuries. The explosion occurred in the regulator room when a match was lighted near where gas mains were being tested.

29 — Cong. Chas. F. Scott will open his campaign over the second district this week and will report home Sunday. On Monday night it has been arranged to hold the last meeting of the campaign in the public square at 8:30 p.m. at which time he will discuss the issues of the campaign.

30 — City Clerk T.F. Zeigler announced yesterday that 2,365 Iolans had registered to vote next Tuesday.

The churches of Iola will unite tomorrow evening in the regular Sunday evening open air services, to be held in the court house square. These meetings have proved very popular and are a great improvement over sweltering little congregations scattered around different churches.

August

1 — The Missouri Pacific has a crew of men at work preparing for the elevating of the bridge across the Neosho river west of town. It is planned to raise the bridge four feet above its present level and the new bridge will not be the same style with the superstructure, but will be a flat bridge.

3 — Chas. F. Scott was one of the victims of a state-wide sweep by the reactionary wing of the Republican Party. He was defeated by Insurgent A.C. Mitchell, who had a majority of about 1,326 votes in the unofficial count. Scott was a member of the so-called stand-pat wing of the party. Most of the candidates identified with that conservative philosophy were defeated in yesterday's primary election.

6 — One hundred and twenty-five workmen are steadily employed in the brick plant connected with the Lumberman's Portland Cement plant at Carlyle. The plant was started up some weeks ago and is turning out brick at the rate of 150,000 a day.

The Socialists polled about 300 votes in the primary election in Allen County.

10 — A prize of $500 will be given by the Iola Commercial Club to the first aeronaut of this city who will successfully navigate an airship between the race track and the court house. The decision grew out of a request from Ed Ault, a local mechanic who is manufacturing a biplane, for $3,000 to complete the work. The club didn't feel able to grant the request but thought offering the prize would be an incentive to Ault to find the funds with which to complete his project.

13 — Tomorrow night the 56 members of Company M of the Kansas National Guard will camp on the north side of the public square and will board the Santa Fe the next morning at 5:30 for Ft. Riley for summer maneuvers.

Capt. Leigh Hunt, Lt. Scott Gard and Lt. Julius M. Ewing are the officers of the company.

There are 72 blocks of sidewalk that have been condemned by Street Commissioner F.O. Beebe and will be relaid as soon as possible. There are about 240 blocks of sidewalk in Iola and about one-third of them have been ordered repaired.

22 — In the federal court at Ft. Scott Saturday application was made for the appointment of a receiver for the Lumberman's Portland Cement plant at Carlyle. The court named attorney Charles H. Apt of Iola as temporary receiver and he took charge of the plant yesterday. The action came as a climax of a series of financial troubles dating back some time. Up to date some $800,000 has been spent on the cement and brick plant and the latter has been operating for some time while the former is estimated to be 90 percent complete.

25 — The city has published the first budget under the commission form of government. The law requires that a budget be published and that no department spend more than is budgeted for its operation.

A local farmer says Bermuda grass is more valuable a crop than alfalfa. It has been planted for some years in Arkansas and is now being tried out in Oklahoma and Kansas. The man urged its merits so strongly that the county commissioners consented to try Bermuda grass on one quarter of the square.

Receiver Charles H. Apt returned to Iola yesterday and said he had no information to give out about the affairs of the Lumberman's Portland plant at Carlyle. Mr. Apt will sell off the brick now stored at the brick plant and protect the plant from damage and await court orders.

29 — A new company called the Kansas Zinc Company has taken over the Cherokee Zinc plants at Gas City and Galesburg and may operate them again. The plants have been closed for about six months.

31 — School opens for the season next Monday and the following

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announcement by Supt. L. W. Mayberry is appreciated. On next Saturday at 9 a.m. an examination will be held in the high school for all pupils who have been making up work during the summer. All of the buildings have been thoroughly fumigated and repaired, new drinking fountains have been installed in the Jefferson building and similar ones will be placed in the other buildings as soon as they arrive.

September

3 — William Newman, one of LaHarpe's most prominent men, yesterday purchased the poultry and cream business from the Pennington Bros. and in the future it will go under the name of the Newman Poultry Co.

"Number, please," is now the signal of the "central" girls at the Bell Telephone company's exchange and a lian is placed on the curt and abrupt, "number?"

6 — While yesterday was Labor Day, comparatively no one in Iola except the banks and the newspapers celebrated. Practically every store was open and doing business. On account of the threatening weather a small program arranged at Electric Park was abandoned.

7 — The city has contracted to buy "all the gas it can use" from the United Zinc and Chemical Company's north field. Worry over the gas supply has been the bane of the commissioners officials career. With this question safely packed Mayor Bolton again walks with a springing step.

Workmen began this morning cutting down trees around the federal building in preparation for the laying of the new cement walk. The walk on the west side of the building will be laid first. It will be of cement covered with crushed granite and will be very wide, extending from the yard curb to the street curb, a distance of about 15 feet.

8 — The young men of the high school will meet before long and organize an athletic association. This will include practically every young man who attends high school. Football and basketball will probably be the two important games indulged in during the coming fall and winter. No steps have been taken as yet toward the organization of a football team, but the Nagoes, a basketball team composed of young men of the high school, met recently and issued a challenge to any team of their weight.

10 — Iola will be increased in population tomorrow by 1,280 people, 500 horses, 40 elephants and 1,000 wild animals when five trains bring the Ringling Bros. Circus into town. There will be two performances here on Monday, one at 2 p.m. and another at 8 p.m. Adults, 50c; children under 12, 25c.

14 — Charles Apt, receiver for the Lumberman Portland Cement company at Carlyle said a proposition looking toward reorganization of the company and resumption of operations at the plant has been submitted to the stockholders. It is, of course, impossible to forecast the outcome, he said.

Twins, a boy and girl, were born to Mr. and Mrs. T. B. Swanson last night at their home here. Both mother and children are resting easily today.

Iola people are pretty well informed as to the difficulties of the Portland cement companies earning dividends during the past two years. Recently the Concrete plant, the third oldest in the state and at the outset one of the most profitable, shut down because of the industrial conditions.

Last year the Kansas plants operated full time, produced a maximum output and sold it all. But they sold thousands of barrels at less than cost of production.

17 — O.S. Taylor, who comes in this city from Topeka, has organized the Iola Amusement Co. and has assumed control of the Lyric and Yale moving picture theaters on the east side of the square. The name of the Lyric will be changed to "The Queen."

28 — Hail the boy scout! The juvenile uniform that is sweeping the country, both the new and old world, in the form of a semi-military organization is about to descend upon Iola. Within a short time organization of companies of boy scouts will begin in Iola. The movement will be launched here with the Young Men's Christian Association taking the lead. The organization of the boy scouts is attracting considerable notice. The chief responsibility resting in a scout council composed of representatives of the city. The formation of this council will be the first step in the movement in this city.

30 — Seven of the 10 miles of eight-inch gasoline which will complete the direct line between Iola and the famous gas wells in the Hogshooter district of Oklahoma are now in the ground and not later than the first of the year the entire line will be completed. The purpose of the line is to bring more natural gas to Iola for use in the Portland cement plants here. The line is being built by the Portland Gas and Pipeline Co., of which Fred Burton is head man for United Kansas and Iola Portland Cement companies.

21 — A new lodge will be organized in Iola tonight which has gained great strength in other sections of the country, namely the Royal Highlanders. Ernest H. Law is state deputy and he will officiate at the institution. A class of 50 will be initiated into the order. It will be known as Ancaster order No. 607.

Max and Fred Butterfield of Yates Center have taken charge of the Bon Ton bakery at 13 East Madison. The brothers are young men and hustlers and will no doubt make good.

October

3 — F. W. Brewster, manager of the Register, sent letters to the county chairmen of the Republican and Democratic parties explaining that the consolidation of the newspapers in Iola that occurred something over a year ago was not intended to deny either party a way to get their message to the public and offering to publish, free of charge, "such political matter as may be supplied to me by yourself, or anyone designated by your committee from day to day from now until the close of the campaign, with the understanding that the material shall not be libelous or personally abusive."

Friends of Brig. Gen. Fred Funston, who is now commanding officer at Ft. Leavenworth Military Reservation, are pleased to learn that he will shortly be reassigned to assume charge of the Department of Luzon in the Philippines.

4 — The city will build a jail behind the police headquarters on South street on the site occupied by the old wooden calaboose of 10 years ago. It is probable the project will be approved and the work started within a short time. It will have four cells and be connected to the police headquarters by a corridor. Iola has been without a city jail for about eight years. The little wooden calaboose which served the purpose was dismantled several years ago and since then prisoners have been sent to the county jail.

7 — Fire late yesterday afternoon consumed the ore bins, four kiln buildings and seriously damaged the four kilns of the Lanyon smelters now operated by the American Metal Company one mile west of LaHarpe. Will receiver J.H. Kirk a party of smelter officials are making an inspection of the debris this afternoon in an effort to determine the damage. The fire will result in the loss of employment at once of 10 or 15 men as soon as the buildings are set rebuilt the entire set of kilns will be closed down, having about 200 men on the pay roll.

The agriculture census gives Iola a count of 8,271 and Allen County, 22,651. Iola is the 15th largest city in Kansas.

10 — The thirteenth to the Brownfield, Davis and Sykes candy factory has been completed and operations will begin here next Monday. The new story will be devoted to the manufacture of barrel cocktail candies, such as peanut and horehound candy. A spacious elevator has been installed.

11 — In the construction of the new 36-foot square addition to the water works all the steel, wood and brick were obtained in Iola. It was found the steel could be obtained and the work done at the United Iron Works just as cheaply as elsewhere. The addition will be used for machine shops and ware rooms.

17 — Harold Kelley entertained about 20 of his young friends at the home Kelley in honor of his 14th birthday. The afternoon was spent with games and refreshments were served.

The Allen County Sanitarium at 310 East Street advertised it is the only institution in the city giving Turkish baths to ladies and gentlemen. It was operated by Dr. C. B. Core and Mrs. F. W. Cantrell.

31 — HALLOWE'EN — A fire which started about 3 a.m. in Skinner's restaurant destroyed 11 buildings, entailing a loss of over $20,000. The burned buildings were in the block west of the northwest corner of the square, and the next block, but one to the square, included were Centre Hotel, Wilson's barn, Miller's restaurant, Bell family home, Skinner's Mantrell and Kelly bakery, R.M. Hunt's photography studio and a garage barn.

November

2 — Hallowe'en was celebrated last night with a riot of noise, color, character and carrying on ranging from a motor car pumpkin parade to the tearing up of whole sections of sidewalk.

3 — Charles D. Close of Chanute wrote a series of articles on how a family of four could live on $10 a week or less.

5 — The Kansas Portland Cement company after a shut down of two months duration for repairs will begin operations again Monday morning.

During the month of October the Great Western Cement Co. plant at Mildred broke all former records for this plant in the manufacture of cement, turning out 32,000 barrels.

7 — The merchants of Iola were favored with the largest volume of business Saturday than for any corresponding day since the balmy trade days of 1906-07.

8 — Kansas and Allen County voted Republican in yesterday's state and national elections. Gov. Horace Stubbs was re-elected to defeat Democrat George Hodges. Congress, however, went Democratic nationally.

10 — This morning at a meeting of the athletic association of the high school, it was decided to organize teams to play the new game of soccer football. The old game of football has been adjudged too rough by the school officials of this city and the boys here been raising about for some time in search of a new game to take its place. Soccer football, so far as could be learned, seems to fill the bill. The trouble is that the boys do not know the rules or where to obtain them. They say they would be very grateful for any information.

18 — Prices at local grocery stores dropped sharply this week. Ham is down to 15 from 19 cents a pound; pork chops from 22 to 20; pork steak from 18 to 16 and chickens with the feathers on are 5 cents down from 10. Prices for apples dropped from 1.25 a bushel to 80 cents and potatoes are also 80 cents a bushel, down from a dollar.

The city commission passed an ordinance requiring the licensing of cars, day driving is eliminated by making it mandatory for all drivers to keep on the right side of the road and to turn corners properly. The speed limit has been fixed at 10 miles an hour within one block of the square, 15 miles an hour outside this limit and 8 miles an hour in turning a corner.

23 — Every school house in Iola is to have a new and improved fire escape. The school board has advertised for bids on the job. A law passed some time ago requires school houses to have not iron ladders but iron stairways.

23 — The Thanksgiving spirit was

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(Continued from page 28)

plainly apparent in the business district this afternoon. On the holiday tomorrow the banks will be closed for the entire day. The postoffice will be closed at 11 a.m. and most of the businesses will close at noon if their customers' needs are satisfied. The schools will be closed for the day but will resume on Friday. Union services will be held at 10:30 a.m. at the Presbyterian church.

What promises to be the largest family dinner party given here in celebration of Thanksgiving will occur at the hotel Pennsylvania with Capt. and Mrs. H.A. Ewing doing the honors of hospitality. Each year on Thanksgiving the children and grandchildren visit with the Ewings and this year there will be an afternoon party at the residence subsequent to the dinner. Those invited are Mr. A.F. Ewing, Mr. and Mrs. H.W. Ewing and four children, Mr. and Mrs. Chas. F. Scott and family, Mr. and Mrs. A.N. Ewing and daughter Annie, Mr. and Mrs. R.A. Ewing and Mr. and Mrs. W.S. Burdick.

24 — For the first time in many, many months, Iolans are to be treated to grand opera. The famous La Bryan Grand Opera Co. will appear at the Grand for one performance on the evening of December 6. There are just four in the company, there being no choral work. The accompanist is an accomplished pianist. They are expected to present the second act of "Martha" and excerpts from Verdi's "Il Trovatore."

26 — J.S. Ellis, a resident of East Iola, was severely injured when he alighted from an Iola electric railway car Thursday. He alighted when the car was in motion and fell upon the pavement.

30 — Iola has a school enrollment of 3,036 this year. It ranks 11th in the cities of the state.

Walter Decker and associates have leased the Reel building on South Washington formerly occupied by the Record and later the Register and will start a modernly equipped bowling alley. The equipment has been purchased and is on the way.

21 — The schools of LaHarpe were yesterday closed indefinitely awaiting an improvement in the smallpox situation, there now being twelve cases of that disease in the city.

22 — The new short dresses have made the problem of petticoats difficult. The length of skirts varies tremendously, from the trotteur that clears the floor by a generous five inches to the calling gown that is still short, but which is distinctly longer than the walking suit. It would be nice to have a different petticoat for every dress and suit, but that is quite impractical for most women. Mrs. Chalmers, writing in the Delineator for January, suggests a lingerie slip with separate flounces. The slip is good in lieu of a corset cover and petticoat. It is finished at the bottom with a facing and small buttons set about two inches apart. To these buttons flounces may be fastened. That allows the equivalent of eight or 10 slips simply by buttoning a suitable flounce on the bottom.

27 — Judge Oscar Foust established a precedent for Kansas today when he enjoined the Iola Township Board from awarding a contract for the construction of about two miles of rock road in Iola Township toward the Humboldt Township line. Judge Foust ruled that, under the 1909 good roads and bridges law the township must first have the counsel of a county engineer whose duty it would be to prepare plans and specifications together with an estimate of the costs and that the contract awarded must be within the estimate and plans of the engineer. This is the first time the question has been passed on in the state.

28 — Dorothy Dix says there is no other career open to women that pays such large dividends as matrimony. The job of a wife is the best job that a woman ever gets and you would think that the domestic woman would realize what a snap she has and would go about with a joyful mien, patting herself on the back and congratulating herself upon her luck.

Yesterday Councilwoman G.C. Glynn sustained a painful fracture of his right arm when he was trying to be of service to his fellow councilwoman, Frank Smith. The engine in Mr. Smith's automobile had stopped. Dr. Glynn happened along and volunteered to crank the machine. When he made an effort to do so the machine back-fired with the result as stated above.

29 — PASADENA — Plans for the 1911 Tournament of Roses (the 22nd annual) are in such shape that the prediction is safe that the pageant on New Year's Day will surpass anything in the city's history. The feature of the field and track events in the afternoon will be four-horse Roman chariot races.

This morning Iola allied herself with the greatest organization for the benefit of boys the world has ever seen when a patrol of its first Boy Scouts, under the leadership of W.S. Hather, physical director of the YMCA, marched from the YMCA building on their first scouting expedition. The following boys are enrolled: James Mann, Merrill Brownfield, Harry Shows, Archie Hall, Hollis Epley, Lee Massengale, Cecil Stout, Raymond Moore, Everett Davis and Claire Dennis.

December

The M.W.A. lodge members met last night and decided to have a rabbit hunt Monday, Dec. 19. The hunters must have their rabbits at the Newman poultry house by 10 o'clock Tuesday morning when the meats will be made. George Ford and William Alexander were elected captains of the two sides. The side having the smaller number of rabbits will have to stand all expenses of a big oyster supper at some future date. There will be at least 100 in each side.

In accordance with an order received by Mrs. J.W. Kelley, manager of the Iola office of the Western Union, the local office will tonight become an all-night station, receiving and sending telegrams at any time during the night. Heretofore the office has been open from 7 a.m. until 8 p.m. on weekdays and from 8 to 10 in the morning and 4 to 6 in the evening on Sundays and holidays.

2 — At the Unity Club meeting at the home of Mrs. Charles F. Scott on Monday, "As You Like It" will be taken up. Miss Nora Funk will conduct the lesson study of the first and second acts for the day. Mrs. Verne Fry will read a paper on "The Forest of Arden" and Miss Grace Davis will compare the writing of Rosalind and Cleopatra. Music has also been arranged for the occasion.

10 — The Portland Gas and Pipeline Co. completed their 18-inch pipeline into the Oklahoma gas fields Thursday. The tapping of this supply means the solution of the fuel problem for the cement plants whose welfare is so closely associated with the welfare of the town. Fred Horton of Iola was head of the company which laid the line.

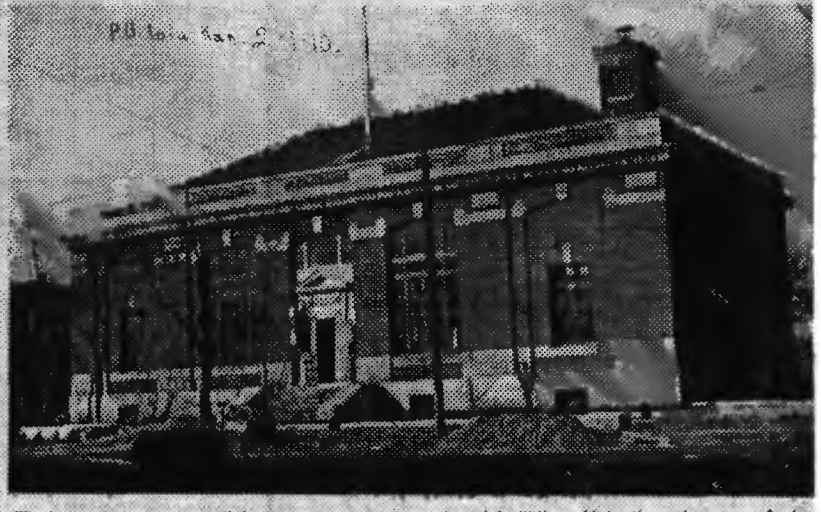
The Socialist Party of Iola has opened headquarters in the south east rooms of the old Courthouse Building and will keep about the ing daily and weekly Socialist p and magazines for the free u those wishing information Socialist lines.

13 — Rev. Nau of the Epis church has received from the Cross Society 5,000 of their C mas seals which are sold Christmas, the proceeds goi ward a fund to stamp out tuber sis. The stamps were first issu 1908.

15 — The Douglass livery bar South street just across from the barn is being torn down. The has been a landmark of South s since the street was there. It was of the first business buildings i "downtown" section of Iola. Part was the remaining frame of o Iola's first industries, a canning fact... and was moved to the S street site some 20 years ago. The is being cleared for the erection modern two-story building by B. Henderson, who is promising the occupancy of M.A. Schlick, proprietor of the South street garage.

20 — They are putting up a spa ing green trees at the Salvation A hall at Madison Avenue and C nut Street and soon its entra boughs and stately branches wi resplendent with glowing can and traveled trinkets. Truly, Christmas will, may come, but the will be especially for the poor down of Iola, for the children might have been skipped hap Capt. T.A. Brown of the Salva Army baited Santa Claus on flying trip through this section a country and urged him to leave presents for the little ones his about to miss.

The Register regrets it cannot in press with clocklike precision thus deliver at the same moment ery night, but it seems impos Therefore each carrier has been plied with a whistle, which he structed to blow as he delivers paper. It was customary here in past and the Register trusts the revival will prove helpful.



Workmen found a warm February 1 in 1910 to hang the big front doors on the nearly completed building. Note that the stone facing along the top is not yet finished.

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DOCUMENT INFO

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Filename: 1910 Mineral Resources of US- Zinc Smelters.pdf

DOCUMENT INFO

DEPARTMENT OF THE INTERIOR.
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

MINERAL RESOURCES

OF THE

UNITED STATES

CALENDAR YEAR

1910

PART I—METALS

WASHINGTON
GOVERNMENT PRINTING OFFICE
1911

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DOCUMENT INFO

Zinc deposits are found in the Mexican States of Tamaulipas, Nuevo Leon, San Luis Potosi, Coahuila, and Chihuahua, but most of the ore imported into the United States has come from the two last mentioned.

CANADA.

A strong endeavor is being made in the Dominion of Canada to develop a commercially successful method of reducing the complex zinc ores of the Kootenay district of British Columbia. The Dominion Government appropriated $50,000 for experimental work, the preliminary research part of which is proceeding satisfactorily at McGill University upon sample lots of zincky ores from the silver-lead mines of the Kootenay region. The concluding work will be done at the Snyder electrothermic zinc smelter of the Canada Zinc Co. at Nelson, British Columbia. Independent experimentation is also under way at Nelson by the French Complex Ore Reduction Co. The scheme followed at the latter plant is to recover the zinc either as spelter or oxide, the silver and copper bearing leady residues being sold to lead smelters. An Elmore flotation machine is being installed at the Wakefield Mill in the Slocan district.

The zinc ore produced in British Columbia now finds its way to the zinc smelters of the United States. In the past the output of these ores has not assumed great importance, but there is no doubt of their extended occurrence, and should commercial success attend the efforts at reduction described above the district would become an important zinc producer. The question of a bounty similar to the lead bounty for the production of zinc ore in Canada has been agitated but so far without success.

AFRICA.

The Rhodesia Broken Hill ore body consists of a deposit of oxidized zinc-lead ore in northwestern Rhodesia, according to a report in the Mining Magazine. Large quantities of ore are in sight at the surface. One outcrop is estimated to show 250,000 long tons of ore averaging 26 per cent of lead and 22½ per cent of zinc, and another outcrop is figured at 300,000 long tons averaging 32 per cent zinc with little lead but much iron oxide and carbonate. The great difficulty has been to find a commercial process to treat the ore. Recently an agreement has been made with the owners of the Bradley-Williams process, and a company has been formed to acquire the Rhodesian rights to the process, which will be first tried on a small scale with a view of ascertaining the costs, as fuel and freight rates will enter largely into the commercial success of the treatment finally adopted. Preliminary tests of the process at Johnson & Sons' Smelting Works were technically satisfactory. The method consists in dissolving the zinc compounds in dilute zinc sulphate carrying a small proportion of free sulphuric acid. The circulation of this electrolyte is continuous, passing as it does first through the ore, then through the electrolytic cell, where metallic zinc is deposited, and the electrolyte is thus regenerated to its original strength by the removal of zinc and the liberation of sulphuric acid.

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AUSTRALIA.

The principal source of zinc in Australia is the silver-lead mines of Broken Hill, New South Wales. In the early days of Broken Hill mining the crude ore ran about 25 per cent each in lead and zinc and 25 ounces in silver, but by 1904 the average tenor had become reduced to 16 per cent each of lead and zinc with 11 ounces of silver to the ton. At present the average tenor is probably somewhat below those figures. In the effort to get rid of the zinc it was heaped up in enormous piles of zinc tailings and slimes from the concentrating plants, and lead concentrates with 20 per cent of zinc were smelted, lead slags averaging 16 per cent of zinc oxide with a maximum of 20 per cent having been run, according to Donald Clark.[1] Various leaching, electrolytic, and magnetic processes were successively tried and finally discarded for the flotation processes which have been in practical use since 1903. This method of concentration has the advantage that it can be applied to the current output of zinc tailings and slimes as well as to the accumulated stocks of those products.

In 1903 the department of mines of New South Wales estimated the tonnage of stored zinc tailings and other zincky residues at 5,687,400 long tons, containing an average of 18.6 per cent of zinc. In 1908 the stocks of zinc tailings were estimated by different authorities to amount to about 7,000,000 tons and to contain about 1,200,000 long tons of zinc, 350,000 tons of lead, and 40,000,000 ounces of silver. A correspondent of the Australian Mining Standard of April 6, 1910, puts the stock of tailings at 6,000,000 tons, the total capacity of the flotation plants when present plans are completed at about 31,000 tons weekly, and the current production of zinc tailings at 24,000 tons weekly. At this rate of excess of consumption over current production, it would require about 16 years for the re-treatment plants to absorb the accumulated tailings. This estimate is contingent upon the continuation in the future of the present rate of production of the mines.

At the Broken Hill Proprietary Co.'s Port Pirie zinc smelter, which when completed early in 1911 will have 10 furnaces and 1,440 retorts, 5 furnaces were finished and several hundred tons of spelter were made in trial runs.

An export duty on zinc concentrates, to encourage Australian zinc smelting and to obtain a measure of independence of European zinc smelters, is being agitated in New South Wales with fair prospects of adoption.

The following table compiled from the annual reports of the department of mines of New South Wales shows the quantity and zinc content of zinc concentrates exported from New South Wales from 1904 to 1910:

Exports of zinc (spelter and concentrates) from New South Wales, 1904–1910, in short tons.

Year.	Concentrates.	Zinc content.	Year.	Concentrates.	Zinc content.
1904	64,514	24,996	1908	309,044	127,515
1905	115,956	34,313	1909	418,775	161,300
1906	114,964	37,438	1910	524,962	207,085
1907	264,601	85,842			

[1] Clark, Donald: Australian mining and metallurgy, Melbourne, 1904, p. 372.

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METALLURGY.

CONCENTRATION AND SEPARATION.

FLOTATION METHODS.

A brief description of the various ore flotation processes was given in Mineral Resources for 1908, Part I, pp. 251–256, and to that summary the reader is referred for more detailed information. In the two years which have elapsed since that description was written, ore flotation has become the standard method of zinc concentration in Australia. The importance of flotation in that country is shown in the following table of the production of zinc concentrates at Broken Hill by flotation methods for the period 1907-1910, compiled from the annual reports of the department of mines of New South Wales. These concentrates are recovered from zinc middlings and tailings, both from the current product and from the stored accumulations of bygone years of milling operations. The minor quantities of lead concentrates recovered, as a table product from the zinc concentrates, are not included:

Production of zinc concentrates at Broken Hill, New South Wales, 1908–1910, in long tons.

Company.	Flotation process used.	1908		1909		1910	
		Tailings treated.	Concentrates.	Tailings treated.	Concentrates.	Tailings treated.	Concentrates.
Sulphide Corporation	Ballot	.....	98,000	.....	92,408	.....	80,401
Broken Hill Proprietary	Potter	276,703	64,373	171,172	52,042	279,150	69,855
Zinc Corporation	Elmore	151,965	45,707	227,802	84,698	270,637	85,635
Minerals Separation	Ballot	.....	32,197	193,842	62,022	240,143	79,288
Amalgamated Zinc (De Bavay's)	De Bavay	74,187	22,590	98,669	30,146	280,394	82,697
British Broken Hill	Elmore	.....	.....	.....	.....	33,428	9,632
Broken Hill Block 10	...do	.....	.....	.....	.....	3,300	955
Total concentrates produced.	.....	.....	262,867	.....	321,316	.....	397,866
Average zinc content	.....	.....	43.7 per cent.	.....	45 per cent.	.....	47.2 per cent.

Two new flotation processes, introduced into the Broken Hill district in 1909, were further developed during 1910. The Murex magnetic process takes advantage of the selective affinity of oils for sulphides of the metals rather than for the gangue minerals. The oils form the base of an adhesive liquid, with which is incorporated some magnetic substance in powdered form. This adhesive liquid is mixed with the pulp and the sulphides are thus agglomerated with the magnetic material. The separation from the gangue is accomplished by passing the mixed pulp beneath a magnet in water, the magnetic material and adhering sulphides being drawn to the magnet and carried away on an endless belt. A small plant has been erected at the Broken Hill Proprietary Block 14 Co.'s mine.

The Horwood process consists in giving the mixed sulphides a preliminary roast at a temperature between 300° and 400° C., in which the iron, copper, and lead sulphides are surficially changed to oxides and sulphates, but the zinc sulphide is unchanged. On treating the roasted material by the ordinary warm acid and oil flotation processes, the deadened surfaces of the oxidized sulphides are inert and only the

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zinc sulphide is floated. This process is especially suitable for the treatment of the slimes of the intimately mixed sulphides, yielding zinc concentrates without further table concentration. The remaining lead slime is available for direct smelting.

Ore flotation has made headway in Europe, but as yet its application in America is practically only experimental. Minerals Separation (Ltd.), of London, has organized an American branch under the title of Minerals Separation American Syndicate (Ltd.), for the purpose of forwarding the interests of that process in this country.

The Adelaide mill at Golconda, Nev., equipped with 100 MacQuisten flotation tubes and having a capacity of 125 tons daily, made a separation of chalcopyrite from a dense quartzose gangue with spinel and garnet, but it is not now in operation. A MacQuisten plant, consisting of 119 MacQuisten tubes, installed at the Morning mill of the Federal Mining & Smelting Co., at Mullan, Idaho, is successfully treating the zinc-barite-siderite middling from the tables and vanners. It is to be increased to 200 tons capacity, according to mining press reports.

The Elmore vacuum-oil flotation process is giving good results in one or two small installations in Mexico. It is reported that an Elmore flotation plant is being installed at the Wakefield mill on Four-Mile Creek in the Slocan district of British Columbia.

ELECTROSTATIC SEPARATION.

The first concentration plant equipped with the Huff electrostatic machines was that of the American Zinc Ore Separating Co., a subsidiary of the American Zinc, Lead, and Smelting Co., and owner of the rights of the separator as applied to the separation of zinc concentrates, the right of using the separator for concentrating other ores being still retained by the Huff Electrostatic Separator Co. This plant, completed in 1908 and located at Platteville, Wis., is of 100 tons daily capacity and is now equipped throughout with Huff machines, though in the original installation there were also Blake-Morscher machines. Working upon the zinc blende-marcasite ore of the upper Mississippi Valley region, the plant makes a 55 to 60 per cent zinc concentrate and a salable marcasite by-product.

The United States Smelting, Refining & Mining Co. is operating, in connection with the concentrating plant at Midvale, Utah, a 50-ton plant equipped with Huff electrostatic machines. The lead-zinc ores from the company's Bingham mines, treated in the concentration plant yield lead concentrates and middlings, the latter carrying 22 per cent zinc as well as some lead and pyrite. The middlings are passed through the Huff machines, yielding a 53 per cent zinc concentrate and a high-grade pyrite product carrying the gold, silver, and lead. The pyrite product is utilized at the lead smelter at Midvale. A separating plant employing the Huff machines will be added to the concentrating plant at Needles, Cal., of the Needles Mining & Smelting Co., a subsidiary of the United States Smelting, Refining & Mining Co. It is reported in the mining press that a Huff separating plant will be installed at Silverton, Colo., and another one at Butte, Mont.

A plant employing the Huff machines to effect a separation of zinc blende and chalcopyrite is under construction on the property of the Calumet & Sonora Mining Co. at Naco, Sonora, Mexico.

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ROASTING AND MAGNETIC SEPARATION.

Roasting and magnetic separation continues in favor for the separation of pyritic zinc ores. In Wisconsin a few years ago there were 25 or 30 such separating plants in operation at individual mines. With the erection of the electrostatic separator at Platteville and several custom magnetic separators it was considered more economical to sell the green ore to the custom separators. The capacity of the custom magnetic separators is being increased, notably the separating plant operated by the Mineral Point Zinc Co. There are now in operation and under construction seven such roasting and magnetic separating plants.

The Empire Zinc Co. of Colorado has a complete separating plant at Canon City, Colo., consisting of both wet and magnetic sections, the latter of which was greatly increased in capacity in 1910. Other new combined magnetic and wet concentration plants in Colorado are the mill of the American Zinc Extraction Co. at the mouth of the Yak tunnel, and the Wilson mill at Robinson, Colo.

The Basin Reduction Co. started a new 300-ton wet concentrator in Jefferson County, 28 miles from Butte, Mont., and the Grasselli Chemical Co. erected a 125-ton wet plant to treat tailings in the Park City district. The latter plant was in addition to the dry concentration plant already in operation by the company at that place.

SMELTING.

METALLURGICAL ADVANCE IN 1910.

The expense of the manual labor necessary in retort zinc smelting and the losses incident to the lack of continuity in that process have stimulated metallurgists to invent mechanical charging devices and to design forms of furnace in which the smelting operation should be continuous.

The Saeger cleaning and charging machines,[1] in use in the Silesian zinc works of Georg von Giesche's Heirs, consist of steel trucks operated by electricity upon tracks parallel to the face of the furnace. Mounted upon each truck in alignment with the sloping retorts are as many banks of screw conveyers as there are banks of retorts in the furnace, and from three to eight conveyers in each bank. After the condensers are removed, the cleaning machine withdraws the residues by inserting the screw conveyer into the retort; then follows the charging machine in which similar conveyers push the charge into the retort. The advantages of the machines are summed up as follows: Saving of half the labor charge; shortening of the injurious cooling-off period while cleaning and charging the furnaces, thereby increasing the time for distillation and consequently the yield; and lastly, more healthful conditions of work.

The Wettengel rotatable furnace,[2] is designed to save time and trouble in charging and cleaning the retorts. These are arranged in batteries in a revolving steel shell. They are turned upright beneath individual hoppers for charging, are revolved into a horizontal position for distillation, and lastly are turned downward for

[1] Metallurgie, Jan. 22, 1910: Translated in Eng. and Min. Jour., Apr. 9, 1910, pp. 780–781.
[2] Electrochem. and Metallurg. Ind., November, 1908, p. 457; April, 1911, pp. 198–201.

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discharging the residues. After recharging they are turned to the horizontal, 180 degrees from the position of first distillation. By thus alternating the top and the bottom of the retort its life is presumably doubled and the residues do not accumulate on one side. A small Wettengel furnace was in operation during 1910 at the works of the American Zinc, Lead & Smelting Co., at Caney, Kans., but the tests are not yet concluded and results are not available.

The Hughes revolving furnace [1] consists of a rotary retort held in place in a rotary shell or combustion chamber. A stack ore hopper feeds continuously into the upper end of the gently sloping retort, which discharges both zinc vapor and residues into a stationary cylindrical condenser at the lower end. Both the size and the temperature of the condenser are controllable. The waste heat of condensation is carried through the hopper, preheating the charge which arrives at the retort with a temperature of about 400° C. A retort 8 inches in diameter and 7 feet in length is shown by experience to have a capacity of about 5 tons of roasted zinc concentrates in 24 hours. Savings are claimed in handling the ore, in more efficient use of the heat, and in initial cost of plant. A small Hughes retort was given a trial test at Butte, Mont., in 1909–10, and a full commercial size retort is now installed at the demonstrating plant of the Hughes-West Continuous Zinc Distillation Co. at Southampton, a suburb of St. Louis, Mo.

Several methods have been proposed recently for smelting lead-zinc concentrates in the ordinary zinc furnace, producing lead-free spelter and lead-bearing residues suitable for lead smelting. One of these is the Hopkins process [2] which employs essentially a charcoal or carbon filter between the retort and the condenser. It is found in practice at Swansea that this process, working on Broken Hill zinc middlings, gave spelter 99.6 per cent pure as compared with 96.5 per cent pure with ordinary condensers, and at the same time gave a much better recovery of the zinc The increased recovery is due to the higher temperatures possible with this method. When the endeavor is also to raise the percentage of recovery, another charcoal or carbon filter is placed in the outer end of the condensers. In a 19-weeks test at Swansea, the Hopkins condensers and ordinary condensers working on opposite sides of the same furnace upon the same ore and in all other respects under the same conditions, the Hopkins condenser averaged more than 7 per cent greater recovery.

A process for smelting zinc-lead slimes and fine concentrates patented by Sulman and Picard, has been recently described.[3] The scheme was devised to treat the fine lead-zinc slimes resulting from the flotation processes at Broken Hill, New South Wales. This material could not be smelted profitably in the ordinary way because the lead destroyed the retorts and because the resulting spelter was too leady to be salable. In the experimental test the material was first carefully roasted in a hand roaster, then mixed and made into briquets composed of roasted ore, 70 per cent; bituminous coal, 25.5 per cent; and pitch, 4.5 per cent. The briquets were of such a size that 14 of them, 2 deep, just filled the retort. After dis-

[1] Mining World, July 10, 1910, p. 131.
[2] Trans. Institute of Metals, London, 1909. Reprinted in Mining Science, Mar. 3, 1910, pp. 198-200.
[3] Hoover, Theodore J., Smelting briquetted zinc ore: Eng. and Min. Jour., Aug. 13, 1910, pp. 323-324.

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tillation the briquets came out of the retorts quite porous, but intact, and well suited for direct lead smelting. There was no tendency for the retorts to "slag up" in the bottom because the briquets came away clear and entire each time. The recovery of zinc, based on the whole run, was 70 per cent, but at times it exceeded 85 per cent. The conclusion is that above 80 per cent recovery could be maintained in commercial operation, which is excellent practice for that class of ore. As results of this process, an otherwise unavailable product was rendered profitable, the spelter commanded a premium for purity, there was 33⅓ per cent increase in capacity of the retorts, and there was a considerable saving of time and waste in cleaning and recharging the retorts.

The problem of the complex lead-zinc ores has also been attacked from the electrochemical side. A 200-ton plant is under construction at Georgetown, Colo., by the Western Metals Co., which will employ the Malm process. In this process the sulphides are subjected to partial dry chlorination in a tube mill, the chloridizing is completed by agitation in a tank with hydrochloric acid, and the metals except zinc, are, by an emulsion of zinc oxide, precipitated in a form suitable, after filtering through asbestos filter presses, for treatment by lead smelters. The zinc chloride solution remaining is evaporated, fused, and electrolyzed, metallic zinc being thus recovered and the chlorine regenerated. The present plant is being constructed in the light of experience gained at the experimental plant previously in operation at Elkhorn, Mont. The Georgetown plant will not be completed until about the middle of 1911.

The occurrence of other metals in connection with zinc in ores offers no special difficulty in electrothermic zinc smelting. Reference is made on a later page to the official experimentation with electrothermic methods of zinc smelting now in progress in the Dominion of Canada. In the United States similar investigation is active. New forms of electric zinc furnaces have been brought out by Hixon (U. S. Patent No. 957,337, May 10, 1910), Woolsey McA. Johnson (U. S. Patent No. 964,268, July 12, 1910), and Fitzgerald. In the new Johnson furnace, the zinc vapors pass through a column of artificially heated coke before reaching the condensing chamber, with the object of completely reducing them and eliminating carbon dioxide, aqueous vapor, etc. The furnace described by Fitzgerald [1] was worked with satisfactory results at the Hohenlohehütte, Upper Silesia. This furnace employs a resistance arch of corrugated carbon plates and reduces the zinc sulphide by the Imbert method in a molten bath of ferric oxide and iron sulphide at a temperature of 1,000° C. to 1,100° C.

Other forms of electric furnace proposed for the reduction of zinc ores were briefly described in Mineral Resources for 1908, Part I, pages 262–264.

[1] Paper read at Fiftieth Anniversary of Massachusetts Institute of Technology.

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ZINC SMELTERS.

The following table gives the zinc-smelting capacity of the United States as determined by a recent canvass:

List of zinc smelters in the United States, showing capacity in 1910.

Company.	Location.	No. of roasting furnaces.	No. of zinc furnaces.	Number of retorts.
American Zinc, Lead & Smelting Co.	Caney, Kans.	3	12	3,648
Do	Dearing, Kans.	3	12	3,840
Bartlesville Zinc Co.	Bartlesville, Okla.	4	14	4,608
Bertha Mineral Co.	Pulaski, Va.	.....	10	1,400
Chanute Zinc Co.	Chanute, Kans.	2	4	1,280
Collinsville Zinc Co.	Collinsville, Ill.	4	12	1,528
Edgar Zinc Co.	Cherryvale, Kans.	8	24	4,800
Do	St. Louis, Mo.	5	9	2,016
Granby Mining and Smelting Co.	Neodesha, Kans.	3	12	3,840
Grasselli Chemical Co.	Clarksburg, W. Va.	.....	10	5,760
Hegeler Bros.	Danville, Ill.	1A	2	1,800
Illinois Zinc Co.	Peru, Ill.	5A	7	4,640
Kansas [Cockerill] Zinc Co. (leased to Beer, Sondheimer & Co.).	Altoona, Kans.	3	6	3,840
Kansas [Cockerill] Zinc Co. (leased to L. Vogelstein & Co.).	Gas City, Kans.	2	4	2,520
Do	La Harpe, Kans.	4	3	1,856
Kansas [Cockerill] Zinc Co.	Pittsburg, Kans.	4	6	1,344
Do	Bruce, Kans.	4	4	896
Do	Nevada, Mo.	3	3	672
Lanyon-Starr Smelting Co.	Bartlesville, Okla.	2	12	3,456
Lanyon Zinc Co., No. 1 (leased to American Metal Co.).	Iola, Kans.	2	10	3,340
Lanyon Zinc Co., No. 2 (leased to American Metal Co.).	.....do.....	3	10	3,320
Lanyon Zinc Co., No. 3 (leased to American Metal Co.).	La Harpe, Kans.	4	10	3,200
Matthiessen & Hegeler Zinc Co.	Lasalle, Ill.	3A	5	4,380
Mineral Point Zinc Co.	Depue, Ill.	2A	6	4,520
National Zinc Co.	Bartlesville, Okla.	3	10	3,040
New Jersey Zinc Co (of Pa.)	South Bethlehem, Pa.	.....	18	1,620
Do	Palmerton, Pa.	.....	14	2,918
Pittsburg Zinc Co.	Pittsburg, Kans.	6	8	910
Prime Western Spelter Co.	Iola, Kans.	3	10	3,240
Do	Gas City, Kans.	8	18	5,340
Sandoval Zinc Co.	Sandoval, Ill.	2	8	996
United States Zinc Co.	Pueblo, Colo.	6	7	1,680
United Zinc and Chemical Co.	Springfield, Ill.	.....	4	2,080
Total		102	304	94,328
Total maximum smelting capacity, short tons.		.....	.....	400,681
Total effective smelting capacity, short tons.		.....	.....	375,000

Zinc-smelting capacity of the United States, by States, in 1910.

State.	Number of retorts.	State.	Number of retorts.
Colorado	1,680	Pennsylvania	4,538
Illinois	19,944	Virginia	1,400
Kansas	47,214	West Virginia	5,760
Missouri	2,666		
Oklahoma	11,104	Total	94,328

The total maximum annual smelting capacity of the 94,328 retorts of the plants listed above is 400,681 short tons. Several of the plants have not been operated for several years, and they are probably abandoned. Certain of the smelters regularly redistill considerable quantities of zinc skimmings and other secondary material, and a proportionate part should be deducted from their

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primary smelting capacity, that is, their capacity for smelting ore. About 6,000 retorts, with an output of 25,500 tons of spelter, should therefore be taken from the maximum capacity, leaving 88,328 retorts and about 375,000 tons as the effective smelting capacity.

Those plants which have an "A" opposite the number of roasting furnaces operate, in addition, sulphuric-acid plants. The Grasselli Chemical Co. operates acid plants in connection with its zinc-roasting furnaces at Grasselli, Ind., and Cleveland, Ohio, the roasted zinc concentrates being shipped to the zinc smelter at Clarksburg. The United Zinc & Chemical Co. has zinc-roasting furnaces at Argentine, Kans., where the sulphur gases are utilized in an acid plant, the roasted concentrates being shipped to the smelter at Springfield, Ill.

NEW ZINC SMELTERS.

The following is a list of proposed new zinc smelters. They are all actually under construction, with the exception of the plant of the Granby Mining & Smelting Co., which it is reported will be started in the early part of 1912. Those smelters with "A" in the zinc-furnace column will manufacture sulphuric acid also.

List of new zinc smelters under construction in 1910.

Company.	Location.	Completed.	Number of zinc furnaces.	Number of retorts.
American Zinc, Lead & Smelting Co.	Hillsboro, Ill.	1912	10 A	4,000
Bartlesville Zinc Co.	Collinsville, Okla.	1912	8	3,200
Granby Mining & Smelting Co.	East St. Louis, Ill.	1914	6 A	2,880
Grasselli Chemical Co.	Meadowbrook, W. Va.	1911	8 A	2,280
Robert Lanyon Zinc & Acid Co.	Hillsboro, Ill.	1912	4 A	1,600
Tulsa Fuel & Manufacturing Co. (subsidiary of Prime Western Spelter Co.).	Collinsville, Okla.	1912	10	4,680

CHANGES IN 1910.

An important feature of the year was the further acquisition of zinc-mining land by several zinc-smelting companies. The New Jersey Zinc Co., in addition to the famous Franklin Furnace and Sterling Hill mines of New Jersey, has, through its subsidiaries, the Empire Zinc Co. and the Empire Zinc Co. of Colorado, for many years had extensive interests in zinc-mining lands in Missouri, Colorado, and other Western States. An affiliation, the Mineral Point Zinc Co., has in the last year or two largely increased the operations and holdings of its mines department in the Wisconsin field. The American Zinc, Lead, & Smelting Co. was engaged in zinc mining before it became interested in smelting; but recently its holdings of productive lands in the Joplin region have been largely increased—as have been the holdings of its subsidiary, the Wisconsin Zinc Co., in the upper Mississippi Valley region. The Granby Mining & Smelting Co. has large tracts of productive territory in the Joplin region which it has heretofore operated on the subleasing basis, but within the year the company has engaged in active mining. The Grasselli Chemical Co. has lately acquired important zinc lands in eastern Tennessee. The American Metal Co., through an affiliated company, has for years held zinc lands in the Joplin region, and is

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reported by the mining press to have recently purchased zinc properties in Western States. Several other smelting companies have been and are still interested in zinc-mining lands on a smaller scale than the foregoing.

The Cockerill Zinc Co. failed early in February. The business was reorganized and continued by the bondholders as the Kansas Zinc Co., and later the Altoona smelter was leased to Beer, Sondheimer & Co. and the Gas City and La Harpe plants were leased to L. Vogelstein & Co. The receivership of the Lanyon Zinc Co. was dissolved in September, but the plants had been operated during the year under lease to the American Metal Co.

In the latter part of 1910 the two plants of the United Zinc & Chemical Co. at Iola, Kans., were dismantled, a part of the equipment being moved to the plant at Springfield, Ill., and the remainder was purchased for use in the new Lanyon smelter at Hillsboro, Ill. The smelter at Rich Hill, Mo., is reported as dismantled. The smelter at Wenona, Ill., is probably abandoned, and is therefore dropped from the list. The plant of the New Jersey Zinc Co. at South Bethlehem was closed down in midyear and will probably not be operated again. Numerous additions to smelting capacity were made during the year, so that on the whole there was a net loss of but 606 retorts in smelting capacity.

The following lists show the plants abandoned and the additions to smelting capacity in 1910:

Plants dismantled or abandoned in 1910.

Company.	Location.	Number of retorts.
Cockerill Zinc Co.	Rich Hill, Mo.	672
New Jersey Zinc Co.	South Bethlehem, Pa.	1,620
United Zinc & Chemical Co.	Iola, Kans.	2,624
Wenona Zinc Works	Wenona, Ill.	512
Total		5,428

Additions to smelting capacity in 1910.

Company.	Location.	Number of retorts.
Bartlesville Zinc Co.	Bartlesville, Okla.	1,152
Lanyon-Starr Smelting Co.	do	1,152
Mineral Point Zinc Co.	Depue, Ill.	760
National Zinc Co.	Bartlesville, Okla.	608
New Jersey Zinc Co.	Palmerton, Pa.	350
United Zinc & Chemical Co.	Springfield, Ill.	800
Total		4,822

CHANGES IN 1911.

It is possible to forecast with fair certainty the changes in smelting capacity during 1911. The plants of the Lanyon Zinc Smelting Co. are being dismantled, the equipment from the works at Iola going into the smelter of the Bartlesville Zinc Co. at Collinsville, Okla., and that from the La Harpe works being used in the Robert Lanyon smelter at Hillsboro, Ill. The zinc-rolling mill at the La Harpe

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plant was purchased by Ball Bros. Glass Manufacturing Co. and is now being operated by the La Harpe Zinc Rolling Mill Co., with an output of 5 tons daily of long strips suitable for making can lids. The Bertha Mineral Co. has closed down and partly dismantled its smelter at Pulaski, Va.

Large increases in retort capacity are under construction at the Palmerton, Pa., plant of the New Jersey Zinc Co., and at the works of the United Zinc & Chemical Co., at Springfield, Ill. The Grasselli Chemical Co. early in the year completed a smelter at Meadowbrook, W. Va., which was started up in March. The roasting furnaces are located at Newcastle, Pa., where sulphuric acid is made, the roasted concentrates being shipped to Meadowbrook for smelting. The net decrease in retort capacity for 1911 will probably be about 4,500 retorts, though this may be partly offset by additions not as yet announced.

Zinc smelters dismantled or abandoned in 1911.

Company.	Location.	No. of retorts.
Bertha Mineral Co	Pulaski, Va	1,600
Lanyon Zinc Smelting Co	Iola and La Harpe, Kans	9,600
Total		11,200

Additions to smelting capacity in 1911.

Company.	Location.	No. of retorts.
Grasselli Chemical Co	Meadowbrook, W. Va	2,280
New Jersey Zinc Co	Palmerton, Pa	2,880
United Zinc and Chemical Co	Springfield, Ill	1,600
Total		6,760

CHANGES IN 1912.

In 1912, as at present planned, new smelters aggregating 13,480 retorts will be completed and there will doubtless be additions to other smelters. On the other hand the year will probably witness the closing of some smelters now in operation.

Smelting capacity to be added in 1912.

Company.	Location.	No. of retorts.
American Zinc, Lead, & Smelting Co	Hillsboro, Ill	4,000
Bartlesville Zinc Co	Collinsville, Okla	3,200
Robert Lanyon Zinc and Acid Co	Hillsboro, Ill	1,600
Tulsa Fuel and Manufacturing Co	Collinsville, Okla	4,680
Total		13,480

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THE MINERAL INDUSTRY

ITS

STATISTICS, TECHNOLOGY AND TRADE

DURING

1910

FOUNDED BY RICHARD P. ROTHWELL

EDITED BY

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ZINC.

The production of spelter in the United States is given in Table I, which as to the ore smelters is compiled from reports officially communicated by every one. As to the dross and scrap smelters the production of three small concerns has been estimated. Under the classification of "dross and scrap" smelters we include only those concerns that work up such material and market the product as spelter. Some of them redistil and some of them simply remelt, skimming off impurities. Their business does not differ essentially from that of the smelters who make spelter out of ore, and indeed a good many of the latter treat dross in connection with ore. Besides this reclamation of zinc from by-products, junk, etc., many consumers of spelter reproduce spelter from their own waste. It is extremely difficult to enumerate accurately the amount of such recovery, and we have not attempted it. Nor would such an enumeration properly play a part in statistics of the spelter industry.

The ore smelters reported a production of 7793 tons of spelter from dross in 1910, and 269,272 tons from ore.

In 1910 there were produced 3398 tons of spelter in bond, most of which had been exported before the end of the year.

All of the ore smelters except two small concerns, whose output of spelter was 6170 tons, reported the amount and sources of their ore receipts, which enables the compilation of Table II.

The statistics for 1909 and 1910 in Table II are not properly comparable, without explanation. Those for 1909 represent the total receipts of zinc ore, both by spelter and oxide manufacturers, except that the

I. PRODUCTION OF SPELTER IN THE UNITED STATES.

States.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.(c)
Colorado	.....	877	4,906	6,599	6,260	5,200	3,079	6,115	6,564
Illinois (a)	49,672	49,526	47,607	45,357	48,238	56,103	50,244	75,229	79,570
Kansas	87,321	87,406	103,721	114,948	129,741	133,561	99,136	103,390	105,697
Missouri	10,548	9,894	12,056	11,800	11,088	11,594	10,196	8,418	6,485
Oklahoma	.....	.....	.....	.....	.....	5,094	14,867	28,840	34,760
South and East (b)	10,698	10,799	13,513	23,044	30,167	38,060	32,989	44,470	43,989
Total tons of 2000lb	158,239	158,502	181,803	201,748	225,494	249,612	210,511	266,462	277,065
Total tons of 2240lb	141,283	141,520	162,324	180,132	201,343	222,868	187,776	237,913	247,364
Total metric tons	143,552	143,792	164,921	183,014	204,548	226,398	190,933	241,730	251,348

(a) Up to 1903, inclusive, includes also the production of Indiana. (b) New Jersey, Pennsylvania and Virginia, and (since 1903) West Virginia. (c) From *Eng. and Min. Journ.*

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II. PRODUCTION OF ZINC ORE IN THE UNITED STATES.

(In tons of 2000 lb.)

State.	1904.	1905.	1906.	1907.	1908.	1909.	1910.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons. (*k*)
Arizona	.....	.....	.....	.....	.....	7,908	7,568
Arkansas	(*e*) 1,900	2,200	4,200	4,088	2,582	(*g*) 320	190
Colorado	(*a*) 94,000	105,500	114,000	142,510	85,052	90,288	77,065
Idaho	*Nil.*	1,700	2,150	11,847	1,558	2,784	10,248
Kentucky	(*d*) 958	(*d*) 414	975	1,005	341	(*g*) 94	179
Mo.-Kan.	(*b*)273,238	(*b*)258,500	(*b*)280,260	297,126	273,420	304,581	289,913
Montana	*Nil.*	2,000	4,900	1,218	2,783	12,037	33,514
Nevada	*Nil.*	*Nil.*	7,080	4,593	1,445	4,609	4,915
New Mexico	(*e*) 21,000	17,800	30,000	4,281	2,290	19,163	15,959
New Jersey	(*d*)280,029	(*d*)361,829	404,690	368,710	399,232	479,699	(*i*)
Oklahoma	.....	.....	.....	3,240	9,300	17,089	1,640
Tennessee	.....	.....	.....	.....	.....	1,710	2,775
Utah	*Nil.*	9,265	10,700	9,043	709	18,130	27,318
Wisconsin	(*c*) 19,300	32,690	42,130	53,011	58,135	69,000	51,383
Others	(*a*) 2,600	(*f*) 3,800	(*h*) 850	(*h*) 2,241	(*h*)1,530	572	46,905
Totals	693,025	795,698	905,175	902,923	838,377	1,027,984	569,572

(*a*) Estimated. (*b*) Production of Joplin district, plus output of southeastern Missouri, the latter as reported by the State mine inspector. (*c*) According to H. F. Bain, "Contributions to Economic Geology," 1904. (*d*) Report of State Geologist; crude ore. (*e*) Partly estimated. (*f*) Arizona, Nevada, Illinois, Iowa, Tennessee and Virginia. (*g*) These figures may be a little too low, there being a possibility that some ore originating in these States has been credited to other States, especially Missouri and Kansas. (*h*) Tennessee, Arizona and California. (*i*) Included in others. (*k*) The statistics for 1910 include only the zinc ore received by producers of spelter, wherefore some apparently peculiar changes from the figures for previous years, which include the receipts by oxide manufacturers.

II a. PRODUCTION OF ZINC IN EUROPE AND AMERICA. (*a*)

(In metric tons.)

Year.	Austria.	Belgium.	France.	Germany.	Holland.	Italy.	Russia.	Spain.	United Kingdom.	United States.	Totals.
1896	6,888	113,361	43,883	152,062	4,770	Nil.	6,227	6,152	25,278	70,432	421,798
1897	6,236	116,067	38,067	160,738	6,083	253	5,966	6,244	22,803	91,070	441,946
1898	7,502	119,067	37,165	164,867	6,700	250	5,664	6,031	26,357	100,514	465,027
1899	7,192	122,843	39,274	184,168	6,235	251	6,321	6,184	22,323	117,844	501,531
1900	6,742	119,315	38,305	155,709	6,345	547	5,983	5,611	20,207	111,794	466,558
1901	7,558	127,170	37,600	166,283	7,850	311	6,060	5,124	20,877	127,761	516,089
1902	8,308	124,780	35,300	174,927	9,910	455	8,250	5,609	18,244	143,562	550,338
1903	8,049	131,749	37,410	182,548	11,516	126	6,901	5,154	44,110	145,782	589,071
1904	8,139	137,323	41,900	194,588	12,905	150	10,647	5,867	46,218	164,921	621,857
1905	9,204	142,855	43,200	198,208	13,500	2	7,220	6,184	50,128	182,014	652,260
1906	10,711	148,035	46,500	205,091	14,850	69	9,619	6,200	52,587	204,345	698,040
1907	11,208	134,402	(*c*)49,753	208,184	14,990	88	10,439	(*c*)8,000	55,586	226,299	717,149
1908	12,770	161,940	47,890	210,420	17,257	(*d*)100	9,869	8,357	54,473	196,223	719,199
1909	12,658	167,100	(*c*)49,718	219,766	19,548	(*b*)	7,948	(*c*)6,400	59,550	241,789	784,499
1910(*f*)	13,305	172,478	(*c*)51,527	227,754	20,978	(*b*)	8,128	(*c*)8,804	(*c*)63,367	250,633	815,997

(*a*) From the official statistics of the various Governments except 1908 to 1910 inclusive, for which years the figures reported to Henry R. Merton & Co. have been used where the official statistics were unavailable. In addition to the production reported in this table, Australia produced 286 long tons in 1903, 299 in 1904, 544 in 1905, 1008 in 1906, 980 in 1907, and 1086 in 1908. (*b*) Included in Austria. (*c*) An approximate separation of the total which is reported for "France and Spain." (*d*) Estimated. (*e*) Includes 508 tons from Australia. (*f*) *Eng. and Min. Journ.*

figure for New Jersey represents the mine production. The figures for 1910 represent the receipts of ore by spelter manufacturers only, with the exceptions previously noted. The concentrates produced from New Jersey ore are included for the total entered under "Other States."

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It seems probable that some of the smelters, in reporting, credited to Missouri and Kansas some ore that came from Oklahoma. The shipments from the Joplin district in 1910 were about 291,000 tons, of which about 15,000 came from Oklahoma. The shipments from Wisconsin mines in 1910 were 62,000 tons, this including what went to oxide works.

The amount of zinc ore reported by the smelters as received from Canada and Mexico in 1910 was 40,993 tons. The imports reported by the government were 83,057 tons. Foreign ore containing 4712 tons of zinc was reëxported, which probably corresponded to about 12,000 tons of ore. Of the imports reported, 11,683 tons were received by the lead smelters. Allowing for changes in the quantity of ore remaining in bond there probably is no irreconcilable discrepancy between the government figures and those of the smelters.

In 1910 sulphuric acid was made as a by-product by seven zinc smelters, their aggregate output having been about 202,000 tons, basis 60 deg. B. These smelters produced 100,791 tons of spelter. They received 49,328 tons of blende ore from Wisconsin, and 102,466 tons from the Joplin district, besides less supplies from the Rocky mountains. It is noteworthy that these works buy nearly the whole output of blende in Wisconsin and about one-third of the total production of zinc ore in the Joplin district.

Consumption.—All of the ore smelters except Chanute and Sandoval reported their stock on hand at the end of 1910. Including a small estimate for these, the total was 23,000 tons. Disregarding any stock that may have been in the hands of dross and scrap smelters the deliveries into consumption in 1909 and 1910 are computed in Table VII.

In addition to the spelter produced in bond and exported in slabs, 4486 tons of foreign spelter was exported in 1910 under drawback privilege. This does not, however, enter properly into a computation of domestic consumption, its application in the manufacture of wares in this country having been a consumption.

As to actual consumption we cannot speak with confidence. Reports from consumers other than brass-makers, accounting for 170,982 tons of spelter, show in their cases about the same consumption as in 1909. In galvanizing there was a trifling increase; in the rolling of sheet zinc a small decrease. Reports received from brass-makers are too incomplete to furnish statistical indication of the position of that industry, but judging from the consumption of copper in 1910 there was probably an increased manufacture of brass.

The consumption of spelter in the United Sates in 1909 was estimated at 261,600 tons. In 1910 it was probably in the neighborhood of 270,000 tons, divided approximately in the ratio of 60 per cent. for galvaniz-

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ing, 20 per cent. for brass-making, 11 per cent. for sheet zinc, and 9 per cent. for other purposes.

Smelting Capacity.—The capacity of American zinc works at the end of 1910 is given in Table III, the number of retorts having been reported officially by all of the producers except Chanute and Sandoval.

Of the total of 91,291 retorts, 10,528 are owned by smelters at Bartlesville, Okla., 22,737 at Iola, Kan., and 22,158 at other places in Kansas. The furnaces of the United States Zinc Company at Pueblo, Colo., have Rhenish retorts. At all of the others the retorts are of the Belgian type.

At the works of the Lanyon Zinc Company at Iola, Kan., the last furnace was closed down on Dec. 26. The three works will now remain closed indefinitely. The American Metal Company has surrendered its lease of them.

The United Zinc and Chemical Company dismantled its Iola plant. At its Springfield plant it added one block of 800 retorts, and began building two blocks comprising 1600 retorts. The Mineral Point Zinc Company increased its plant at Depue by one block of 600 retorts. The Bartlesville Zinc Company added two blocks, comprising 1152 retorts.

Of the old coal smelteries, the Pittsburg Zinc Company closed its plant early in 1911, and the Cockerill plant at Nevada, Mo., also was closed. On the other hand, the works at Collinsville, Ill., long idle,

III. ZINC SMELTING CAPACITY OF THE UNITED STATES AT END OF 1910.

Name.	Location.	Furnaces.	Retorts.
American Zinc, Lead and Smelting Co.	Deering, Kan.	6	3,840
American Zinc, Lead and Smelting Co.	Caney, Kan.	6	3,648
Bartlesville Zinc Co.	Bartlesville, Okla.	8	4,608
Bertha Mineral Co.	Pulaski, Va.	10	1,400
Chanute Zinc Co.	Chanute, Kan.	4	1,260
Cockerill Zinc Co. (Rose, Sondheimer & Co.)	Altoona, Kan.	6	3,840
Cockerill Zinc Co. (L. Vogelstein & Co.)*	Gas City, Kan.	4	2,560
Cockerill Zinc Co. (L. Vogelstein & Co.)	La Harpe, Kan.	3	1,853
Cockerill Zinc Co.*	Nevada, Mo.	3	648
Collinsville Zinc Co.	Collinsville, Ill.	6	[illegible]
Edgar Zinc Co.	St. Louis, Mo.	9	[illegible]
Edgar Zinc Co.	Cherryvale, Kan.	24	[illegible]
Granby Mining and Smelting Co.	Neodesha, Kan.	6	[illegible]
Grasselli Chemical Co.	Clarksburg, W. Va.	10	[illegible]
Hegeler Bros.	Danville, Ill.	2	[illegible]
Illinois Zinc Co.	Peru, Ill.	7	[illegible]
Lanyon-Starr Smelting Co.	Bartlesville, Okla.	5	[illegible]
Lanyon Zinc Co.*	Iola-La Harpe, Kan.	15	[illegible]
Matthiessen & Hegeler	Lasalle, Ill.	5	[illegible]
Mineral Point Zinc Co.	Depue, Ill.	6	[illegible]
National Zinc Co.	Bartlesville, Okla.	5	[illegible]
New Jersey Zinc Co.	Palmerton, Penn.	12	[illegible]
New Jersey Zinc Co.	Bethlehem, Penn.	19	[illegible]
Pittsburg Zinc Co.	Pittsburg, Kan.	4	[illegible]
Prime Western Spelter Co.	Gas, Kan.	14	[illegible]
Sandoval Zinc Co.	Sandoval, Ill.	4	[illegible]
United States Zinc Co.	Pueblo, Colo.	7	[illegible]
United Zinc and Chemical Co.	Springfield, Ill.	3	[illegible]
*Inactive.		213	91,291

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IV. EXPORTS OF ZINC ORE AND ZINC OXIDE FROM THE UNITED STATES. (a)

Year.	Ore.			Oxide.		
	Short tons.	Value.	Value per ton.	Short tons.	Value.	Value per ton.
1897....	9,251	$211,350	$22.85	1,859	$104,140	$56.02
1898....	11,782	299,970	25.50	3,925	252,194	64.25
1899....	28,221	725,944	25.90	5,343	366,598	68.61
1900....	42,062	1,134,663	26.98	5,656	496,380	87.76
1901....	44,146	1,167,684	26.45	4,561	393,259	86.22
1902....	55,733	1,449,104	26.00	5,358	433,722	80.93
1903....	39,411	987,000	25.04	7,215	578,215	80.14
1904....	35,911	905,782	25.22	8,157	628,494	77.05
1905....	30,946	848,451	27.41	11,280	810,203	71.83
1906....	27,720	733,300	26.45	15,578	1,149,297	73.78
1907....	20,352	579,490	28.47	13,256	1,069,924	80.71
1908....	26,108	877,745	33.60	12,008	845,070	70.37
1909....	12,456	412,300	33.10	14,846	1,026,377	69.14
1910....	19,711	649,425	32.95	13,166	943,968	71.69

(a) In addition to the exports of ore, 15,887 short tons of zinc dross (galvanizers' waste) were exported in 1906, 9593 short tons in 1907, 8405 short tons in 1908, 7069 short tons in 1909 and 4728 short tons in 1910.

V. EXPORTS OF DOMESTIC SPELTER FROM THE UNITED STATES. (a)

Year.	Plates, Sheets, Pigs and Bars.		Wares.	Total Value.
	Short Tons.	Value.	Value.	
1896.....	10,150	$1,[illegible]	$61,001	$1,112,029
1897.....	14,245	1,[illegible]	71,021	1,743,049
1898.....	10,499	1,[illegible]	138,165	1,724,188
1899.....	6,755	[illegible]	143,232	1,978,295
1900.....	22,411	[illegible]	99,288	2,317,251
1901.....	3,390	[illegible]	82,046	310,952
1902.....	3,237	[illegible]	114,197	414,754
1903.....	1,521	[illegible]	71,354	234,733
1904.....	10,073	[illegible]	117,957	1,212,447
1905.....	5,516	[illegible]	159,995	842,249
1906.....	4,670	[illegible]	204,269	787,795
1907.....	563	[illegible]	186,283	261,397
1908.....	2,640	[illegible]	88,485	338,739
1909.....	2,566	[illegible]	69,751	332,761
1910.....	3,989	[illegible]	101,336	527,836

(a) There is also a comparatively insignificant re-export of foreign-made spelter and zinc wares.

VI. IMPORTS OF ZINC AND ZINC OXIDE INTO THE UNITED STATES.
(In pounds.)

Year.	Sheets, Blocks, Pigs and Old.		Manufactures.	Total Value.	Oxide.	
	Amount.	Value.			Dry.	In Oil.
1896..	856,044	$25,904	$15,728	$41,632	4,572,781	311,023
1897..	2,557,341	95,883	19,431	115,314	5,564,753	502,357
1898..	2,742,357	109,624	13,448	123,072	3,342,235	27,050
1899..	2,985,463	151,956	14,800	166,756	3,012,709	41,609
1900..	2,013,196	97,772	36,836	134,608	2,618,808	38,706
1901..	775,881	30,920	42,643	73,563	3,199,778	128,198
1902..	1,238,091	46,713	37,191	83,904	3,271,385	163,081
1903..	728,614	30,900	18,938	49,838	3,487,042	166,034
1904..	933,474	44,326	11,918	56,244	2,585,661	224,244
1905..	1,042,081	51,052	12,390	63,442	3,436,367	342,944
1906..	4,407,481	253,310	17,385	270,695	4,191,476	292,538
1907..	3,555,890	210,322	16,282	226,604	5,311,318	362,418
1908..	1,762,627	85,885	7,474	93,359	4,635,101	210,166
1909..	19,340,029	826,588	19,176	845,764	6,119,328	535,024
1910..	6,904,389	289,689	27,475	317,164	6,133,840	336,257

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VII. DELIVERIES OF SPELTER IN THE UNITED STATES.

(In tons of 2000 lb.)

	1905.	1906.	1907.	1908.	1909.	1910.
Stock, Jan 1....	6,500	4,000	4,550	32,883	25,000	11,500
Production.....	201,748	225,494	249,612	210,511	282,459	288,415
Imports.....	521	2,203	1,778	881	9,670	3,452
Total supply.	208,769	231,697	255,940	244,275	317,129	303,367
Exports(a)....	5,515	4,670	563	2,640	2,900	8,457
Stock, Dec. 31..	4,000	4,550	32,883	25,000	11,500	23,000
Deliveries.....	199,254	222,477	222,494	216,635	302,729	271,892

(a) Includes domestic and foreign.

VIII. CONSUMPTION OF SPELTER IN THE UNITED STATES.

(In tons of 2000 lb.)

Purpose.	1906.(a)	1907.(b)	1908.(b)	1909.(b)	1905.	1906.	1907.	1908.	1909.	1910.
					Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Galvanising.....	124,000	150,000	119,000	164,000	50	55	62.7	62.2	62.7	60.0
Brass-making.....	57,000	44,000	33,000	48,000	26	25½	18.4	17.2	18.3	20.0
Sheet zinc.....	36,000	30,000	27,000	33,000	17	16	12.4	14.1	12.6	11.0
Lead desilverisation	2,500	2,600	2,500	2,600	1¼	1	1.1	1.3	1.0	1.0
Other purposes (a) ..	6,000	12,894	10,000	14,000	5¾	2¾	5.4	5.2	5.4	8.0
Total.....	225,500	239,494	191,500	261,600	100	100	100	100	100.0	100.0

(a) The apparent falling off in the consumption of zinc for "other purposes" in 1906 is explained by a more complete itemisation of the consumption in 1906: in other words, there was probably more spelter used for brass-making in 1905 than the above table shows. (b) The statistics of consumption for 1907 have been revised from those stated in THE MINERAL INDUSTRY, Vol. XVI, so as to include the consumption of reclaimed spelter, which is also included in the statistics for 1908 and 1909. For a full discussion of this subject see *Eng. and Min. Journ.*, June 12, 1909.

IX. PRODUCTION OF ZINC OXIDE IN THE UNITED STATES. (a)

Year.	Quantity.		Value.		Year.	Quantity.		Value.	
	Short Tons.	Metric Tons.	Totals.	Per Short Tons.		Short Tons.	Metric Tons.	Totals.	Per Short Ton.
1897 .	26,262	23,285	$1,686,020	$64.26	1904.	59,613	54,081	4,523,414	75.88
1898 .	32,747	29,708	2,226,796	68.00	1905.	72,603	65,859	5,808,240	80.00
1899 .	39,663	35,982	3,331,692	84.00	1906.	77,800	70,573	6,257,361	80.43
1900 .	47,151	42,775	3,772,080	80.00	1907.	85,390	77,449	7,731,100	73.28
1901 .	46,500	42,266	3,720,000	80.00	1908.	65,100	59,046	5,876,342	90.26
1902 .	52,730	46,929	4,023,299	76.30	1909.	.....	.....	.....	.....
1903 .	59,562	54,034	5,005,394	83.69	1910.	.....	.....	.....	.....

(a) The figures for 1905 and 1906 include zinc-lead pigment, which was not included in the statistics for previous years.

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X. IMPORTS OF ZINC ORE INTO THE UNITED STATES.
(In tons of 2000 lb.)

Source.	1905.	1906.	1907.	1908.	1909.	1910.
British Columbia..	8,561	600	1,157	6,157	10,024	4,675
Mexico.....	(a)32,164	(a)88,900	(a)108,800	66,383	106,245	80,309
Totals.....	40,725	89,500	109,957	72,540	116,269	85,084

(a) The actual tonnage of ore imported was somewhat greater than this figure, but it included some mixed ore which for statistical purposes has been reduced to the zinc ore equivalent. This table is based on reports from the smelters of the ore received by them from these countries.

were put once more into operation. The Cockerill Zinc Company went out of business in 1910, its Altoona works being taken over by Beer, Sondheimer & Co., and its La Harpe and Gas City works by L. Vogelstein & Co., the other plants becoming idle.

At the end of 1910 plans were on foot for one new smeltery in the gas-field of Oklahoma, and for a least three plants in the coalfields of Illinois. Construction of some of these will go on in 1911. Since the beginning of 1911 the works of the Bertha Mineral Company at Pulaski, Va., have been closed, and also those of the New Jersey Zinc Company at Bethlehem, Penn. The Palmerton works are being enlarged to take the place of Bethlehem.

Zinc Mining in the United States.

Arizona.—Zinc mining has taken on a new life in the Cerbat mining district in northwestern Arizona. About 750 tons per month were shipped during 1910. The ore is smelted at Bartlesville, Oklahoma. The actual mining costs are high, amounting to $20.30 per ton of shipping ore.

Colorado[1] (By T. J. Dalzell).—The finding of enormous bodies of zinc carbonate in the old upper workings of many of the Leadville mines has opened a new era for the prosperity of the camp. These bodies were supposed, when encountered, to be spar, and were considered valueless. Such old mines as the Iron Silver, Henrietta and Maid, Wolftone and Louisville contain great amounts of ore, containing from 15 to 30 per cent. zinc, and it is estimated that more than a million tons of such ore exist in the old workings of mines opened on the white-limestone contact. The full utilization of these deposits will require new metallurgical methods to aid in either their treatment or their concentration. In the past, Colorado metallurgists have not failed in solving such problems, and the State may look for new and commercially successful methods which will permit the mining of these new mineral resources of the Leadville district. These new zinc deposits increased the production of the Leadville district 33 1/3 per cent. in 1910, as compared with 1909. The total zinc production in 1910 was 62,475,647 pounds.

[1] *Report*, State Bureau of Mines, Denver, Colo.

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UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

MINERAL RESOURCES

OF THE

UNITED STATES

CALENDAR YEAR

1910

PART I—METALS

WASHINGTON
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1911

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Zinc deposits are found in the Mexican States of Tamaulipas, Nuevo Leon, San Luis Potosi, Coahuila, and Chihuahua, but most of the ore imported into the United States has come from the two last mentioned.

CANADA.

A strong endeavor is being made in the Dominion of Canada to develop a commercially successful method of reducing the complex zinc ores of the Kootenay district of British Columbia. The Dominion Government appropriated $50,000 for experimental work, the preliminary research part of which is proceeding satisfactorily at McGill University upon sample lots of zincky ores from the silver-lead mines of the Kootenay region. The concluding work will be done at the Snyder electrothermic zinc smelter of the Canada Zinc Co. at Nelson, British Columbia. Independent experimentation is also under way at Nelson by the French Complex Ore Reduction Co. The scheme followed at the latter plant is to recover the zinc either as spelter or oxide, the silver and copper bearing leady residues being sold to lead smelters. An Elmore flotation machine is being installed at the Wakefield Mill in the Slocan district.

The zinc ore produced in British Columbia now finds its way to the zinc smelters of the United States. In the past the output of these ores has not assumed great importance, but there is no doubt of their extended occurrence, and should commercial success attend the efforts at reduction described above the district would become an important zinc producer. The question of a bounty similar to the lead bounty for the production of zinc ore in Canada has been agitated but so far without success.

AFRICA.

The Rhodesia Broken Hill ore body consists of a deposit of oxidized zinc-lead ore in northwestern Rhodesia, according to a report in the Mining Magazine. Large quantities of ore are in sight at the surface. One outcrop is estimated to show 250,000 long tons of ore averaging 26 per cent of lead and 22½ per cent of zinc, and another outcrop is figured at 300,000 long tons averaging 32 per cent zinc with little lead but much iron oxide and carbonate. The great difficulty has been to find a commercial process to treat the ore. Recently an agreement has been made with the owners of the Bradley-Williams process, and a company has been formed to acquire the Rhodesian rights to the process, which will be first tried on a small scale with a view of ascertaining the costs, as fuel and freight rates will enter largely into the commercial success of the treatment finally adopted. Preliminary tests of the process at Johnson & Sons' Smelting Works were technically satisfactory. The method consists in dissolving the zinc compounds in dilute zinc sulphate carrying a small proportion of free sulphuric acid. The circulation of this electrolyte is continuous, passing as it does first through the ore, then through the electrolytic cell, where metallic zinc is deposited, and the electrolyte is thus regenerated to its original strength by the removal of zinc and the liberation of sulphuric acid.

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AUSTRALIA.

The principal source of zinc in Australia is the silver-lead mines of Broken Hill, New South Wales. In the early days of Broken Hill mining the crude ore ran about 25 per cent each in lead and zinc and 25 ounces in silver, but by 1904 the average tenor had become reduced to 16 per cent each of lead and zinc with 11 ounces of silver to the ton. At present the average tenor is probably somewhat below those figures. In the effort to get rid of the zinc it was heaped up in enormous piles of zinc tailings and slimes from the concentrating plants, and lead concentrates with 20 per cent of zinc were smelted, lead slags averaging 16 per cent of zinc oxide with a maximum of 20 per cent having been run, according to Donald Clark.[1] Various leaching, electrolytic, and magnetic processes were successively tried and finally discarded for the flotation processes which have been in practical use since 1903. This method of concentration has the advantage that it can be applied to the current output of zinc tailings and slimes as well as to the accumulated stocks of those products.

In 1903 the department of mines of New South Wales estimated the tonnage of stored zinc tailings and other zincky residues at 5,687,400 long tons, containing an average of 18.6 per cent of zinc. In 1908 the stocks of zinc tailings were estimated by different authorities to amount to about 7,000,000 tons and to contain about 1,200,000 long tons of zinc, 350,000 tons of lead, and 40,000,000 ounces of silver. A correspondent of the Australian Mining Standard of April 6, 1910, puts the stock of tailings at 6,000,000 tons, the total capacity of the flotation plants when present plans are completed at about 31,000 tons weekly, and the current production of zinc tailings at 24,000 tons weekly. At this rate of excess of consumption over current production, it would require about 16 years for the re-treatment plants to absorb the accumulated tailings. This estimate is contingent upon the continuation in the future of the present rate of production of the mines.

At the Broken Hill Proprietary Co.'s Port Pirie zinc smelter, which when completed early in 1911 will have 10 furnaces and 1,440 retorts, 5 furnaces were finished and several hundred tons of spelter were made in trial runs.

An export duty on zinc concentrates, to encourage Australian zinc smelting and to obtain a measure of independence of European zinc smelters, is being agitated in New South Wales with fair prospects of adoption.

The following table compiled from the annual reports of the department of mines of New South Wales shows the quantity and zinc content of zinc concentrates exported from New South Wales from 1904 to 1910:

Exports of zinc (spelter and concentrates) from New South Wales, 1904–1910, in short tons.

Year.	Concentrates.	Zinc content.	Year.	Concentrates.	Zinc content.
1904	64,514	24,996	1908	309,044	127,515
1905	115,956	34,313	1909	413,775	161,300
1906	114,964	37,438	1910	524,962	207,085
1907	264,601	85,842			

[1] Clark, Donald: Australian mining and metallurgy, Melbourne, 1904, p. 372.

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METALLURGY.

CONCENTRATION AND SEPARATION.

FLOTATION METHODS.

A brief description of the various ore flotation processes was given in Mineral Resources for 1908, Part I, pp. 251–256, and to that summary the reader is referred for more detailed information. In the two years which have elapsed since that description was written, ore flotation has become the standard method of zinc concentration in Australia. The importance of flotation in that country is shown in the following table of the production of zinc concentrates at Broken Hill by flotation methods for the period 1907-1910, compiled from the annual reports of the department of mines of New South Wales. These concentrates are recovered from zinc middlings and tailings, both from the current product and from the stored accumulations of bygone years of milling operations. The minor quantities of lead concentrates recovered, as a table product from the zinc concentrates, are not included:

Production of zinc concentrates at Broken Hill, New South Wales, 1908–1910, in long tons.

Company.	Flotation process used.	1908		1909		1910	
		Tailings treated.	Concentrates.	Tailings treated.	Concentrates.	Tailings treated.	Concentrates.
Sulphide Corporation	Ballot	.....	98,000	.....	92,408	.....	80,401
Broken Hill Proprietary	Potter	276,703	64,373	171,172	52,042	279,150	69,855
Zinc Corporation	Elmore	131,965	45,707	227,802	84,696	270,637	85,635
Minerals Separation	Ballot	.....	32,197	193,842	62,022	240,143	79,288
Amalgamated Zinc (De Bavay's).	De Bavay	74,187	22,590	98,669	30,146	280,394	82,697
British Broken Hill	Elmore	.....	.....	.....	.....	33,428	9,632
Broken Hill Block 10	...do	.....	.....	.....	.....	3,300	965
Total concentrates produced.	.....	.....	262,867	.....	321,316	.....	397,868
Average zinc content	.....	.....	43.7 per cent.	.....	45 per cent.	.....	47.2 per cent.

Two new flotation processes, introduced into the Broken Hill district in 1909, were further developed during 1910. The Murex magnetic process takes advantage of the selective affinity of oils for sulphides of the metals rather than for the gangue minerals. The oils form the base of an adhesive liquid, with which is incorporated some magnetic substance in powdered form. This adhesive liquid is mixed with the pulp and the sulphides are thus agglomerated with the magnetic material. The separation from the gangue is accomplished by passing the mixed pulp beneath a magnet in water, the magnetic material and adhering sulphides being drawn to the magnet and carried away on an endless belt. A small plant has been erected at the Broken Hill Proprietary Block 14 Co.'s mine.

The Horwood process consists in giving the mixed sulphides a preliminary roast at a temperature between 300° and 400° C., in which the iron, copper, and lead sulphides are surficially changed to oxides and sulphates, but the zinc sulphide is unchanged. On treating the roasted material by the ordinary warm acid and oil flotation processes, the deadened surfaces of the oxidized sulphides are inert and only the

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zinc sulphide is floated. This process is especially suitable for the treatment of the slimes of the intimately mixed sulphides, yielding zinc concentrates without further table concentration. The remaining lead slime is available for direct smelting.

Ore flotation has made headway in Europe, but as yet its application in America is practically only experimental. Minerals Separation (Ltd.), of London, has organized an American branch under the title of Minerals Separation American Syndicate (Ltd.), for the purpose of forwarding the interests of that process in this country.

The Adelaide mill at Golconda, Nev., equipped with 100 MacQuisten flotation tubes and having a capacity of 125 tons daily, made a separation of chalcopyrite from a dense quartzose gangue with spinel and garnet, but it is not now in operation. A MacQuisten plant, consisting of 119 MacQuisten tubes, installed at the Morning mill of the Federal Mining & Smelting Co., at Mullan, Idaho, is successfully treating the zinc-barite-siderite middling from the tables and vanners. It is to be increased to 200 tons capacity, according to mining press reports.

The Elmore vacuum-oil flotation process is giving good results in one or two small installations in Mexico. It is reported that an Elmore flotation plant is being installed at the Wakefield mill on Four-Mile Creek in the Slocan district of British Columbia.

ELECTROSTATIC SEPARATION.

The first concentration plant equipped with the Huff electrostatic machines was that of the American Zinc Ore Separating Co., a subsidiary of the American Zinc, Lead, and Smelting Co., and owner of the rights of the separator as applied to the separation of zinc concentrates, the right of using the separator for concentrating other ores being still retained by the Huff Electrostatic Separator Co. This plant, completed in 1908 and located at Platteville, Wis., is of 100 tons daily capacity and is now equipped throughout with Huff machines, though in the original installation there were also Blake-Morscher machines. Working upon the zinc blende-marcasite ore of the upper Mississippi Valley region, the plant makes a 55 to 60 per cent zinc concentrate and a salable marcasite by-product.

The United States Smelting, Refining & Mining Co. is operating, in connection with the concentrating plant at Midvale, Utah, a 50-ton plant equipped with Huff electrostatic machines. The lead-zinc ores from the company's Bingham mines, treated in the concentration plant yield lead concentrates and middlings, the latter carrying 22 per cent zinc as well as some lead and pyrite. The middlings are passed through the Huff machines, yielding a 53 per cent zinc concentrate and a high-grade pyrite product carrying the gold, silver, and lead. The pyrite product is utilized at the lead smelter at Midvale. A separating plant employing the Huff machines will be added to the concentrating plant at Needles, Cal., of the Needles Mining & Smelting Co., a subsidiary of the United States Smelting, Refining & Mining Co. It is reported in the mining press that a Huff separating plant will be installed at Silverton, Colo., and another one at Butte, Mont.

A plant employing the Huff machines to effect a separation of zinc blende and chalcopyrite is under construction on the property of the Calumet & Sonora Mining Co. at Naco, Sonora, Mexico.

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ROASTING AND MAGNETIC SEPARATION.

Roasting and magnetic separation continues in favor for the separation of pyritic zinc ores. In Wisconsin a few years ago there were 25 or 30 such separating plants in operation at individual mines. With the erection of the electrostatic separator at Platteville and several custom magnetic separators it was considered more economical to sell the green ore to the custom separators. The capacity of the custom magnetic separators is being increased, notably the separating plant operated by the Mineral Point Zinc Co. There are now in operation and under construction seven such roasting and magnetic separating plants.

The Empire Zinc Co. of Colorado has a complete separating plant at Canon City, Colo., consisting of both wet and magnetic sections, the latter of which was greatly increased in capacity in 1910. Other new combined magnetic and wet concentration plants in Colorado are the mill of the American Zinc Extraction Co. at the mouth of the Yak tunnel, and the Wilson mill at Robinson, Colo.

The Basin Reduction Co. started a new 300-ton wet concentrator in Jefferson County, 28 miles from Butte, Mont., and the Grasselli Chemical Co. erected a 125-ton wet plant to treat tailings in the Park City district. The latter plant was in addition to the dry concentration plant already in operation by the company at that place.

SMELTING.

METALLURGICAL ADVANCE IN 1910.

The expense of the manual labor necessary in retort zinc smelting and the losses incident to the lack of continuity in that process have stimulated metallurgists to invent mechanical charging devices and to design forms of furnace in which the smelting operation should be continuous.

The Saeger cleaning and charging machines,[1] in use in the Silesian zinc works of Georg von Giesche's Heirs, consist of steel trucks operated by electricity upon tracks parallel to the face of the furnace. Mounted upon each truck in alignment with the sloping retorts are as many banks of screw conveyers as there are banks of retorts in the furnace, and from three to eight conveyers in each bank. After the condensers are removed, the cleaning machine withdraws the residues by inserting the screw conveyer into the retort; then follows the charging machine in which similar conveyers push the charge into the retort. The advantages of the machines are summed up as follows: Saving of half the labor charge; shortening of the injurious cooling-off period while cleaning and charging the furnaces, thereby increasing the time for distillation and consequently the yield; and lastly, more healthful conditions of work.

The Wettengel rotatable furnace,[2] is designed to save time and trouble in charging and cleaning the retorts. These are arranged in batteries in a revolving steel shell. They are turned upright beneath individual hoppers for charging, are revolved into a horizontal position for distillation, and lastly are turned downward for

[1] Metallurgie, Jan. 22, 1910: Translated in Eng. and Min. Jour., Apr. 9, 1910, pp. 780–781.
[2] Electrochem. and Metallurg. Ind., November, 1908, p. 457; April, 1911, pp. 198–201.

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discharging the residues. After recharging they are turned to the horizontal, 180 degrees from the position of first distillation. By thus alternating the top and the bottom of the retort its life is presumably doubled and the residues do not accumulate on one side. A small Wettengel furnace was in operation during 1910 at the works of the American Zinc, Lead & Smelting Co., at Caney, Kans., but the tests are not yet concluded and results are not available.

The Hughes revolving furnace [1] consists of a rotary retort held in place in a rotary shell or combustion chamber. A stack ore hopper feeds continuously into the upper end of the gently sloping retort, which discharges both zinc vapor and residues into a stationary cylindrical condenser at the lower end. Both the size and the temperature of the condenser are controllable. The waste heat of condensation is carried through the hopper, preheating the charge which arrives at the retort with a temperature of about 400° C. A retort 8 inches in diameter and 7 feet in length is shown by experience to have a capacity of about 5 tons of roasted zinc concentrates in 24 hours. Savings are claimed in handling the ore, in more efficient use of the heat, and in initial cost of plant. A small Hughes retort was given a trial test at Butte, Mont., in 1909–10, and a full commercial size retort is now installed at the demonstrating plant of the Hughes-West Continuous Zinc Distillation Co. at Southampton, a suburb of St. Louis, Mo.

Several methods have been proposed recently for smelting lead-zinc concentrates in the ordinary zinc furnace, producing lead-free spelter and lead-bearing residues suitable for lead smelting. One of these is the Hopkins process [2] which employs essentially a charcoal or carbon filter between the retort and the condenser. It is found in practice at Swansea that this process, working on Broken Hill zinc middlings, gave spelter 99.6 per cent pure as compared with 96.5 per cent pure with ordinary condensers, and at the same time gave a much better recovery of the zinc The increased recovery is due to the higher temperatures possible with this method. When the endeavor is also to raise the percentage of recovery, another charcoal or carbon filter is placed in the outer end of the condensers. In a 19-weeks test at Swansea, the Hopkins condensers and ordinary condensers working on opposite sides of the same furnace upon the same ore and in all other respects under the same conditions, the Hopkins condenser averaged more than 7 per cent greater recovery.

A process for smelting zinc-lead slimes and fine concentrates patented by Sulman and Picard, has been recently described.[3] The scheme was devised to treat the fine lead-zinc slimes resulting from the flotation processes at Broken Hill, New South Wales. This material could not be smelted profitably in the ordinary way because the lead destroyed the retorts and because the resulting spelter was too leady to be salable. In the experimental test the material was first carefully roasted in a hand roaster, then mixed and made into briquets composed of roasted ore, 70 per cent; bituminous coal, 25.5 per cent; and pitch, 4.5 per cent. The briquets were of such a size that 14 of them, 2 deep, just filled the retort. After dis-

[1] Mining World, July 10, 1910, p. 131.
[2] Trans. Institute of Metals, London, 1909. Reprinted in Mining Science, Mar. 3, 1910, pp. 198-200.
[3] Hoover, Theodore J., Smelting briquetted zinc ore: Eng. and Min. Jour., Aug. 13, 1910, pp. 323-324.

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tillation the briquets came out of the retorts quite porous, but intact, and well suited for direct lead smelting. There was no tendency for the retorts to "slag up" in the bottom because the briquets came away clear and entire each time. The recovery of zinc, based on the whole run, was 70 per cent, but at times it exceeded 85 per cent. The conclusion is that above 80 per cent recovery could be maintained in commercial operation, which is excellent practice for that class of ore. As results of this process, an otherwise unavailable product was rendered profitable, the spelter commanded a premium for purity, there was 33⅓ per cent increase in capacity of the retorts, and there was a considerable saving of time and waste in cleaning and recharging the retorts.

The problem of the complex lead-zinc ores has also been attacked from the electrochemical side. A 200-ton plant is under construction at Georgetown, Colo., by the Western Metals Co., which will employ the Malm process. In this process the sulphides are subjected to partial dry chlorination in a tube mill, the chloridizing is completed by agitation in a tank with hydrochloric acid, and the metals except zinc, are, by an emulsion of zinc oxide, precipitated in a form suitable, after filtering through asbestos filter presses, for treatment by lead smelters. The zinc chloride solution remaining is evaporated, fused, and electrolyzed, metallic zinc being thus recovered and the chlorine regenerated. The present plant is being constructed in the light of experience gained at the experimental plant previously in operation at Elkhorn, Mont. The Georgetown plant will not be completed until about the middle of 1911.

The occurrence of other metals in connection with zinc in ores offers no special difficulty in electrothermic zinc smelting. Reference is made on a later page to the official experimentation with electrothermic methods of zinc smelting now in progress in the Dominion of Canada. In the United States similar investigation is active. New forms of electric zinc furnaces have been brought out by Hixon (U. S. Patent No. 957,337, May 10, 1910), Woolsey McA. Johnson (U. S. Patent No. 964,268, July 12, 1910), and Fitzgerald. In the new Johnson furnace, the zinc vapors pass through a column of artificially heated coke before reaching the condensing chamber, with the object of completely reducing them and eliminating carbon dioxide, aqueous vapor, etc. The furnace described by Fitzgerald [1] was worked with satisfactory results at the Hohenlohehütte, Upper Silesia. This furnace employs a resistance arch of corrugated carbon plates and reduces the zinc sulphide by the Imbert method in a molten bath of ferric oxide and iron sulphide at a temperature of 1,000° C. to 1,100° C.

Other forms of electric furnace proposed for the reduction of zinc ores were briefly described in Mineral Resources for 1908, Part I, pages 262–264.

[1] Paper read at Fiftieth Anniversary of Massachusetts Institute of Technology.

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ZINC SMELTERS.

The following table gives the zinc-smelting capacity of the United States as determined by a recent canvass:

List of zinc smelters in the United States, showing capacity in 1910.

Company.	Location.	No. of roasting furnaces.	No. of zinc furnaces.	Number of retorts.
American Zinc, Lead & Smelting Co.	Caney, Kans.	3	12	3,648
Do	Dearing, Kans.	3	12	3,840
Bartlesville Zinc Co	Bartlesville, Okla.	4	14	4,608
Bertha Mineral Co.	Pulaski, Va.	.....	10	1,400
Chanute Zinc Co	Chanute, Kans.	2	4	1,280
Collinsville Zinc Co	Collinsville, Ill.	4	12	1,528
Edgar Zinc Co	Cherryvale, Kans.	8	24	4,800
Do	St. Louis, Mo.	5	9	2,016
Granby Mining and Smelting Co	Neodesha, Kans.	3	12	3,840
Grasselli Chemical Co	Clarksburg, W. Va.	.....	10	5,760
Hegeler Bros.	Danville, Ill.	1A	2	1,800
Illinois Zinc Co	Peru, Ill.	5A	7	4,640
Kansas [Cockerill] Zinc Co. (leased to Beer, Sondheimer & Co.).	Altoona, Kans.	3	6	3,840
Kansas [Cockerill] Zinc Co. (leased to L. Vogelstein & Co.).	Gas City, Kans.	2	4	2,520
Do	La Harpe, Kans.	4	3	1,856
Kansas [Cockerill] Zinc Co	Pittsburg, Kans.	4	6	1,344
Do	Bruce, Kans.	4	4	896
Do	Nevada, Mo.	3	3	672
Lanyon-Starr Smelting Co.	Bartlesville, Okla.	2	12	3,456
Lanyon Zinc Co., No. 1 (leased to American Metal Co.).	Iola, Kans.	2	10	3,340
Lanyon Zinc Co., No. 2 (leased to American Metal Co.).	.....do	3	10	3,320
Lanyon Zinc Co., No. 3 (leased to American Metal Co.).	La Harpe, Kans.	4	10	3,200
Matthiessen & Hegeler Zinc Co.	Lasalle, Ill.	3A	5	4,380
Mineral Point Zinc Co.	Depue, Ill.	2A	6	4,520
National Zinc Co.	Bartlesville, Okla.	3	10	3,040
New Jersey Zinc Co (of Pa.)	South Bethlehem, Pa.	.....	18	1,620
Do	Palmerton, Pa.	.....	14	2,918
Pittsburg Zinc Co.	Pittsburg, Kans.	6	8	910
Prime Western Spelter Co	Iola, Kans.	3	10	3,240
Do	Gas City, Kans.	8	18	5,340
Sandoval Zinc Co.	Sandoval, Ill.	2	8	996
United States Zinc Co.	Pueblo, Colo.	6	7	1,680
United Zinc and Chemical Co.	Springfield, Ill.	.....	4	2,080
Total		102	304	94,328
Total maximum smelting capacity, short tons.		.....	.....	400,681
Total effective smelting capacity, short tons.		.....	.....	375,000

Zinc-smelting capacity of the United States, by States, in 1910.

State.	Number of retorts.	State.	Number of retorts.
Colorado	1,680	Pennsylvania	4,538
Illinois	19,944	Virginia	1,400
Kansas	47,214	West Virginia	5,760
Missouri	2,688		
Oklahoma	11,104	Total	94,328

The total maximum annual smelting capacity of the 94,328 retorts of the plants listed above is 400,681 short tons. Several of the plants have not been operated for several years, and they are probably abandoned. Certain of the smelters regularly redistill considerable quantities of zinc skimmings and other secondary material, and a proportionate part should be deducted from their

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primary smelting capacity, that is, their capacity for smelting ore. About 6,000 retorts, with an output of 25,500 tons of spelter, should therefore be taken from the maximum capacity, leaving 88,328 retorts and about 375,000 tons as the effective smelting capacity.

Those plants which have an "A" opposite the number of roasting furnaces operate, in addition, sulphuric-acid plants. The Grasselli Chemical Co. operates acid plants in connection with its zinc-roasting furnaces at Grasselli, Ind., and Cleveland, Ohio, the roasted zinc concentrates being shipped to the zinc smelter at Clarksburg. The United Zinc & Chemical Co. has zinc-roasting furnaces at Argentine, Kans., where the sulphur gases are utilized in an acid plant, the roasted concentrates being shipped to the smelter at Springfield, Ill.

NEW ZINC SMELTERS.

The following is a list of proposed new zinc smelters. They are all actually under construction, with the exception of the plant of the Granby Mining & Smelting Co., which it is reported will be started in the early part of 1912. Those smelters with "A" in the zinc-furnace column will manufacture sulphuric acid also.

List of new zinc smelters under construction in 1910.

Company.	Location.	Completed.	Number of zinc furnaces.	Number of retorts.
American Zinc, Lead & Smelting Co	Hillsboro, Ill	1912	10 A	4,000
Bartlesville Zinc Co	Collinsville, Okla	1912	8	3,200
Granby Mining & Smelting Co	East St. Louis, Ill	1914	6 A	2,880
Grasselli Chemical Co	Meadowbrook, W. Va	1911	8 A	2,280
Robert Lanyon Zinc & Acid Co	Hillsboro, Ill	1912	4 A	1,600
Tulsa Fuel & Manufacturing Co. (subsidiary of Prime Western Spelter Co.).	Collinsville, Okla	1912	10	4,680

CHANGES IN 1910.

An important feature of the year was the further acquisition of zinc-mining land by several zinc-smelting companies. The New Jersey Zinc Co., in addition to the famous Franklin Furnace and Sterling Hill mines of New Jersey, has, through its subsidiaries, the Empire Zinc Co. and the Empire Zinc Co. of Colorado, for many years had extensive interests in zinc-mining lands in Missouri, Colorado, and other Western States. An affiliation, the Mineral Point Zinc Co., has in the last year or two largely increased the operations and holdings of its mines department in the Wisconsin field. The American Zinc, Lead, & Smelting Co. was engaged in zinc mining before it became interested in smelting; but recently its holdings of productive lands in the Joplin region have been largely increased—as have been the holdings of its subsidiary, the Wisconsin Zinc Co., in the upper Mississippi Valley region. The Granby Mining & Smelting Co. has large tracts of productive territory in the Joplin region which it has heretofore operated on the subleasing basis, but within the year the company has engaged in active mining. The Grasselli Chemical Co. has lately acquired important zinc lands in eastern Tennessee. The American Metal Co., through an affiliated company, has for years held zinc lands in the Joplin region, and is

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reported by the mining press to have recently purchased zinc properties in Western States. Several other smelting companies have been and are still interested in zinc-mining lands on a smaller scale than the foregoing.

The Cockerill Zinc Co. failed early in February. The business was reorganized and continued by the bondholders as the Kansas Zinc Co., and later the Altoona smelter was leased to Beer, Sondheimer & Co. and the Gas City and La Harpe plants were leased to L. Vogelstein & Co. The receivership of the Lanyon Zinc Co. was dissolved in September, but the plants had been operated during the year under lease to the American Metal Co.

In the latter part of 1910 the two plants of the United Zinc & Chemical Co. at Iola, Kans., were dismantled, a part of the equipment being moved to the plant at Springfield, Ill., and the remainder was purchased for use in the new Lanyon smelter at Hillsboro, Ill. The smelter at Rich Hill, Mo., is reported as dismantled. The smelter at Wenona, Ill., is probably abandoned, and is therefore dropped from the list. The plant of the New Jersey Zinc Co. at South Bethlehem was closed down in midyear and will probably not be operated again. Numerous additions to smelting capacity were made during the year, so that on the whole there was a net loss of but 606 retorts in smelting capacity.

The following lists show the plants abandoned and the additions to smelting capacity in 1910:

Plants dismantled or abandoned in 1910.

Company.	Location.	Number of retorts.
Cockerill Zinc Co.	Rich Hill, Mo.	672
New Jersey Zinc Co.	South Bethlehem, Pa.	1,620
United Zinc & Chemical Co.	Iola, Kans.	2,624
Wenona Zinc Works.	Wenona, Ill.	512
Total.		5,428

Additions to smelting capacity in 1910.

Company.	Location.	Number of retorts.
Bartlesville Zinc Co.	Bartlesville, Okla.	1,152
Lanyon-Starr Smelting Co.	do.	1,152
Mineral Point Zinc Co.	Depue, Ill.	760
National Zinc Co.	Bartlesville, Okla.	606
New Jersey Zinc Co.	Palmerton, Pa.	350
United Zinc & Chemical Co.	Springfield, Ill.	800
Total.		4,822

CHANGES IN 1911.

It is possible to forecast with fair certainty the changes in smelting capacity during 1911. The plants of the Lanyon Zinc Smelting Co. are being dismantled, the equipment from the works at Iola going into the smelter of the Bartlesville Zinc Co. at Collinsville, Okla., and that from the La Harpe works being used in the Robert Lanyon smelter at Hillsboro, Ill. The zinc-rolling mill at the La Harpe

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plant was purchased by Ball Bros. Glass Manufacturing Co. and is now being operated by the La Harpe Zinc Rolling Mill Co., with an output of 5 tons daily of long strips suitable for making can lids. The Bertha Mineral Co. has closed down and partly dismantled its smelter at Pulaski, Va.

Large increases in retort capacity are under construction at the Palmerton, Pa., plant of the New Jersey Zinc Co., and at the works of the United Zinc & Chemical Co., at Springfield, Ill. The Grasselli Chemical Co. early in the year completed a smelter at Meadowbrook, W. Va., which was started up in March. The roasting furnaces are located at Newcastle, Pa., where sulphuric acid is made, the roasted concentrates being shipped to Meadowbrook for smelting. The net decrease in retort capacity for 1911 will probably be about 4,500 retorts, though this may be partly offset by additions not as yet announced.

Zinc smelters dismantled or abandoned in 1911.

Company.	Location.	No. of retorts.
Bertha Mineral Co	Pulaski, Va	1,400
Lanyon Zinc Smelting Co	Iola and La Harpe, Kans.	9,860
Total		11,260

Additions to smelting capacity in 1911.

Company.	Location.	No. of retorts.
Grasselli Chemical Co	Meadowbrook, W. Va.	2,280
New Jersey Zinc Co	Palmerton, Pa.	2,880
United Zinc and Chemical Co.	Springfield, Ill.	1,600
Total		6,760

CHANGES IN 1912.

In 1912, as at present planned, new smelters aggregating 13,480 retorts will be completed and there will doubtless be additions to other smelters. On the other hand the year will probably witness the closing of some smelters now in operation.

Smelting capacity to be added in 1912.

Company.	Location.	No. of retorts.
American Zinc, Lead, & Smelting Co.	Hillsboro, Ill.	4,000
Bartlesville Zinc Co.	Collinsville, Okla.	3,200
Robert Lanyon Zinc and Acid Co.	Hillsboro, Ill.	1,600
Tulsa Fuel and Manufacturing Co.	Collinsville, Okla.	4,680
Total		13,480

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THE IOLA DAILY REGISTI

SUCCESSOR TO THE IOLA DAILY REGISTER, THE IOLA DAILY RECORD AND THE IOLA DAILY INDEX.

VOLUME XII. NUMBER 98. IOLA, KANSAS, FEBRUARY 23, 1910.—WEDNESDAY EVENING.

LL FORECLOSE ANYON MORTGAGE

FINAL STEPS BEING TAKEN IN THE LANYON ZINC CASE.

OTECTING BOND HOLDERS

D RECEIVERSHIP AND REORGANIZE THE COMPANY.

his Will Be Sold to Satisfy Judgment for $2,000,000 and Unpaid Interest.

Judgment for $2,464,660, and an er of foreclosure was granted to Trust Company of America inst the Lanyon Zinc company by ige Oscar Foust this morning The perty of the company was also ordered sold to pay the indebtedness. e date of the sale will be set by the riff after the order has been plain his hands.

Acting for the bondholders, the ust Company of America instituted action to foreclose last spring and Q. Rodgers, president of the Lan- company, was made receiver, and been in charge of the plants since time. He will be retained as reiver until the sale of the property. When the case came up for final aring this morning C. H. Werner, the firm of Parker, Hatch and eahan, of New York City, and C. E. nton of Ft. Scott, appeared for the aintiff, and A. H. Campbell for the fendant. Mr. Judson, assistant easurer of the plaintiff company, ok the stand and testified as to the nount of bonds issued by the defendit. He said the defendant had deuited in the sum of $2,464,660 in the terest payments on the bonds. J. O odgers, the receiver, who followed Judson, testified that in his judg-

THE WEATHER.

Forecast for Kansas: Snow tonight or Thursday; rising temperature.

Data recorded at U. S. Weather Bureau Office today, yesterday and a year ago.

February 22.

	Yest'dy.	Yr Ago
2 p. m.	27	37
4 p. m.	26	61
6 p m	23	57
8 p m.	15	51
10 p. m.	10	51
12 midnight	7	51
Maximum temperature	28	61
Minimum temperature	7	30
Precipitation 7 p. m.	T	0.05

February 23.

	Today.	Yr Ago
2 a m.	6	31
4 a. m	5	30
6 a. m	4	31
8 a m	4	35
10 a m.	7	37
12 noon	6	43
Precipitation 7 a m	0	0.5

THIS IS IOLA, RHODE ISLAND

K. C. STAR MAKES ANOTHER DETOUR FROM THE TRUTH.

Classes Scott as Rhode Islander One Day and a Troglodyte When He Heeds McCook Post.

The Kansas City Star might properly carry at the top of its front page the line: "Consistency, thou art a mule!" For the Star never permits a little thing like consistency to interfere with its warfare on man or measure which it decides to down. The quality of the entertainment thus furnished by the Star is enhanced by the smirking air of hypocritical virtue which it wears like a mask; the viciousness of its malice lies in the fact that it would require the combined effort of an hundred country papers to correct any lie the Star might see fit to circulate. That the Star is deliber-

FORT SCOTT BOY RELEASED AT LAST

J. A. COOK WAS IMPRISONED IN A MEXICAN JAIL.

LOCKED UP FOR SIX MONTHS

WAS CONDUCTOR ON TRAIN THAT THE MEXICANS ROBBED.

State Department Requested That He Be Admitted to Bail and Finally Won Out.

(By the Associated Press.)

Ft. Scott, Feb 23—J A Cook, the Mexican railway conductor, who has been in jail at Guadalajara, Mexico, for the last six months, was released today, according to a telegram received by the jailer in this city Cook's detention in jail was denounced by the Brotherhood of Conductors of America This order made an appeal to President Taft and the State Department has been investigating

Mexico has a law holding conductors of trains responsible for robberies or accidents to their trains. Cook's train was systematically robbed by the Mexican crew, and under the law Cook was placed in jail. Efforts to release him failed and the Americans working on the Mexican railroads decided to quit in a body. The State Department, also, got busy, Congressman Scott having been requested by Bourbon county people to push the matter Little progress seemed to be made but efforts did not cease, and the release of Cook is the result For months he was ready to give bond, but the government, which owns the roads, would not accept bail. He languished in prison, suffering in health and mind and the news that he has at

STUBBS' KEY NOTE FELL VERY FLAT

COMMENT OF JAY HOUSE ON THE BERRYTON SPEECH.

LONG IS NO GRANDSTAND MAN

EX-SENATOR NOT AFRAID TO STAND BY HIS GUNS.

Balie Waggener Counts in the Democratic Camp. But Barkley's Card Has Run Out, Says House.

Topeka, Feb 22—Governor Stubbs sounded his keynote in a speech to the farmers around Berryton, a small community in Shawnee county on Friday of last week. Next to Bryan, Governor Stubbs has what probably is the first private collection of keynotes in this country. In his Berryton talk he made it apparent that a law for the control of public utilities will be his chief issue in the coming campaign. It will be recalled that it was the Governor's public utilities bill his opponents put under the steam roller at the last session of the legislature The administration newspapers were very indignant over the matter and said at the time that the public utilities issue would be the governor's chief weapon this year But interest in the matter had apparently petered out, and until he made his Berryton speech it was not generally known that the Governor would make control of the public utilities his chef-d'ouevre

eral years ago and he did not have it renewed. But Balie must be reckoned with Waggener says he likes Hodges personally, but is against him for the reason that he stands for precisely the things for which Stubbs stands He says he'd just as soon vote for Stubbs, and as between voting for Stubbs and being bitten by a rattlesnake Balie would unhesitatingly select the snake. The Democrats, aided and abetted by D O. McCray, have worked up a good deal of lather over the matter They diagnose it as a railroad plot to beat Hodges I don't see much of a railroad plot in the thing, for, as a matter of fact, the railroads have entirely recovered from the scare Stubbs threw into them when he was first elected Take it from me, and it's straight, the railroads would as soon see Stubbs re-elected as not I don't mean by that to infer that Stubbs is chumming with the representatives of corporate greed Far from it He is undeniably sincere in his efforts and intent to curb them. But somehow, the railroads have come out of their blue funk. They have found that Stubbs is disposed to be fair and decent to them and prefer to take no chances with a new man

I note, incidentally, some newspaper animadversions directed at the late Chester I. Long. I never was what you might call wildly enthusiastic about Mr. Long, although he is an able man. I concede, to save argument, that he may have gotten out of touch with his Kansas constituency, and that he may have become imbued with the Rhode Island idea I admit also, to save argument, that he perpetrated the crime of recommending a corporation Democrat for a place on the Federal bench. But there is one thing about Long that challenges my admiration He never played to the grandstand. Nobody ever saw Long trying to curry favor with the

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(By the A New York, F boarded the sm the city early terminal at Je huge revolvers up the car in wounding two and then jump

The two me rison Highbee ly prominent were riding in friends Soon terminal, a negr woman of his men of making man. Lord to quiet, which th ing. "I'll kill Roger Young, of the party, a ing on to him the car but k the ground.

panic, passeng doors or hidin negroes escap it is said will

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WILL KEEP

Prime Western Spelter Company(

To) Articles of Association.

Whom it May Concern: (

Know All Men By These Presents: That We, whose names are hereunto subscribed, do hereby associate ourselves together for the purpose of forming a corporation under the provisions of the laws of the State of Missouri, and more particularly under the provisions of the Revised Statutes of the State of Missouri, Chapter XLII, Article VIII., and for that purpose state:

First.--- The name of this Corporation shall be

"Prime Western Spelter Company".

Second.--- The business of this Corporation shall be conducted at the city of Nevada, in the county of Vernon and State of Missouri.

Third.--- The Capital Stock of this Corporation is ($50,000) Fifty thousand Dollars, divided into Fifty shares, of the par value of $1,000 dollars each. The same has been bona fide subscribed, and all thereof actually paid up in lawful money of the United States, and is in the custody of the persons hereinafter named as the first Board of Directors.

Fourth.--- The names and places of residence of the several shareholders, and the number of shares subscribed by each, are as follows:

Name	Place of Residence	No. of Shares.
L. T. McRae	Iola, Kansas	25
J. A. Daly	Nevada, Missouri	11-1/2
F. M. Daly	Iola, Kansas	1
L. H. Callaway	Nevada, Missouri	11-1/2
G. R. Godfrey	Nevada, Missouri	1

Fifth.--- The business of this Corporation shall be managed by a Board of Directors, composed of Five Directors and the following named shareholders shall constitute the Board of Directors of this Corporation for the first year:

J. A. Daly,

L. H. Callaway,

F. M. Daly,

G. R. Godfry,

L. T. McRae.

Sixth.--- This Corporation shall continue as a body politic for the term of Fifty years.

Seventh.--- The purposes for which this corporation are formed are to mine and dig for mineral of all kinds; to conduct a milling or smelting business; to buy and sell real estate; to lease and operate mining lands.

In Testimony of all which we have hereunto set our hands and seals this twenty-second day of August, 1898.

L. T. McRae, (Seal)
L. H. Callaway, (Seal)
G. R. Godfrey, (Seal)
J. A. Daly, (Seal)
F. M. Daly, (Seal)

State of Missouri
County of Vernon.

On this twenty-second day of August, 1898, personally appeared before me, a Notary Public within and for Vernon County, Missouri, L. T. McRae, L. H. Callaway, G. R. Godfrey, J. A. Daly and F. M. Daly, who were by me this 22nd day of August, 1898, duly sworn, and each and every of the above named parties acknowledged that he executed the foregoing instrument as his free act and deed for the purposes therein mentioned.

In Testimony whereof, I have hereunto set my hand and affixed my official seal, at my office in Nevada, Missouri, th

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and year first above written.

My term expires on the March 12, 1902.

(seal) Jay H. Rinehart, Notary Public.

R. S. 10¢. Vernon County, Missouri.

Filed & Recorded Aug. 22nd, 1898, at 8 A. M.

Jno. B. Harvey, Recorder.

By E. M. Potter, Dep.

State of Missouri,)
)ss
County of Vernon,)

I, Jno. B. Harvey, Recorder of said County, do hereby certify that the above and foregoing is a true and correct copy of the records of my office, as the same appear in Book 77, of Deeds at page 440, this 23rd day of August, 1898.

In Testimony Whereof, Witness my hand and official seal at my office in Nevada, Mo., the day and year last above written.

Jno. B. Harvey, President,

(seal) By E. M. Potter, Deputy.

- - - - - - - - - - - - -

Filed and certificate of incorporation issued Aug 25 1898.

A. A. Lesueur,

Secretary of State.

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Office of Prime Western Spelter Company, Nevada, Missouri, April 23rd, 1901.

Be it Known, On this 23rd. day of April, A.D. 1901, in pursuance of the following notice published for the first time on the 22nd. day of February, 1901, and for the last time on the 19th. day of April, 1901, and once in each week between said dates, all of said publications being in the "Southwest Mail" a weekly newspaper published in the City of Nevada, Missouri in the County of Vernon and State of Missouri, to wit:

Notice of Stockholders Meeting:

Office of Prime Western Spelter Company:
Nevada, Mo. February 20th., 1901.

Notice is hereby given that a meeting of the Stockholders of the Prime Western Spelter Company will be held at the office of the Company in the City of Nevada, Missouri, on Tuesday the 23rd. day of April, 1901, at nine o'clock A.M. for the purpose of voting upon the proposition then and there to be submitted to increase the Capital Stock of this Company from Fifty Thousand Dollars, it's present authorized Capital to One Hundred Thousand Dollars.

J. A. Daly President,
W. L. Callaway Secretary.
L. T. McRae, G. R. Godfrey, L. H. Callaway } Directors
All of the directors.

And in pursuance also of a like notice addressed to each shareholder at his usual place of residence, postage pre paid, and deposited at the Post Office at the City of Nevada, Mo., on the 21st. day of February, 1901, stockholders representing all of the shares of the Capital Stock of said Prime Western Spelter Company met at the office in the Duck Block, in the City of Nevada, in the County of Vernon and State of Missouri, on the 23rd. day of April, A.D. 1901, at nine o'clock A.M. The Meeting was organized by the election of J.A. Daly, one of the directors of said Company, Chairman, and selecting A.B. Cockerill, Secretary;----- The Secretary read the proposition as set forth in said published notice advertising the meeting, to increase the Capital Stock of this Company from Fifty Thousand Dollars($50,000^{00}$) to One Hundred Thousand Dollars($100,000^{00}$), and on motion it was resolved that the vote of the stockholders on said proposition be taken by ballot; and thereupon the Chairman appointed W.L. Callaway and George R. Godfrey, shareholders, inspectors, and said Callaway and Godfrey having been duly sworn, as required by law, proceeded to receive and inspect the votes cast, all of the stockholders of this Company being present in person, and for that purpose the polls were kept open until the hour on one O'clock P.M., on said day at which hour they were closed, and the said inspectors, after inspecting and counting all the votes cast, reported that the whole number of votes cast were fifty, all of which had been cast in favor of the proposition voted upon; and it thus appearing--the total number of shares of said Company being Fifty, that the stockholders had all been in favor and so voted in favor of the proposition to increase the Capital Stock, the Chairman thereupon declared the proposition duly carried adopted.

Be it further known that the Capital Stock of this Company is Fifty Thousand Dollars($50,000^{00}$), divided into fifty shares of the par value of One Thousand Dollars($1,000^{00}$) each, all of which is fully paid up. The amount of the assets of the Company is One Hundred and Fifty-four Thousand Four Hundred and Twenty-five 14/100 Dollars; and the whole amount of the liabilities of the Company is Fifty Thousand Three Hundred and Seventy-one & 73/100 Dollars; and the amount to which the Capital is to be increased by the vote of the Stockholders taken this day, as above stated, is One Hundred Thousand Dollars ($100,000^{00}$) the increased stock to be divided into fifty shares of the par value of One Thousand Dollars ($1,000^{00}$) each.

EPA7-002004

and that all of said increase has been actually paid up in lawful money of the United States, and is in the hands of the Board of Directors of said Company.

J. A. Daly
Chairman Stockholders Meeting

Countersigned:
A. E. Comerill
Secretary.

State of Missouri)
County of Vernon))

J. A. Daly, being duly sworn upon his oath states that matters and things set forth in the above statement subscribed by him are true. J. A. Daly, Chairman

Sworn to and subscribed to before me, in the City of Nevada, in the County of Vernon in the State of Missouri, this 23rd. day of April, 1901.

My term expires on the 30th. day of April, 1904.

(Notarial seal) Eleise J. Blue
Notary Public, Vernon County, Missouri.

State of Missouri)
County of Vernon)

On this, the twenty-third day of April, A. D. 1901, before me personally appeared J. A. Daly, to me known to be the person described in and who executed the for-going statement, and acknowledged that he executed the same as his free act and deed for the purposes therein mentioned.

In Witness Whereof, I have hereunto set my hand and Notarial seal, this 23rd day of April, 1901, at my office in the City of Nevada, County of Vernon and State of Missouri. My term as Notary Public expires on the 30th. day of April, 1904. Eleise J. Blue,
Notary Public, Vernon County, Missouri

(Notarial) (seal)

State of Missouri)
County of Vernon)

I, the undersigned, Recorder of Deeds in and for Vernon County, Missouri, do hereby Certify that the foregoing is a true copy of the original statement of Capital of Prime Western Spelter Company From Fifty Thousand Dollars to One Hundred Thousand Dollars, together with the affidavit of the Chairman, the certificate of acknowledgement, and the date of filing of record thereof, as the same remains of record in my office in Book 90 at Page 276.

In Witness Whereof, I have hereunto set my hand and affixed my official seal, Done at my office in Vernon County, Missouri, this 24th, day of April, 1901.

G. G. Ewing
Recorder of Deeds for Vernon County, Missouri.

By W. H. Ewing Deputy Recorder.

EPA7-002005

#10275

Prime Western Spelter Company.

Statement of Increase of Capital Stock from $50,000 to $100,000

IVE

FILED AND CERTIFICATE ISSUED

APR 25 1901

SECRETARY OF STATE

EPA7-002006

DOCUMENT INFO

EDFolder: D:\Question 09\Presentation Cited Docs\Prime Western\

Filename: 1902 A Review of Progress in the Metallurgy of Zinc in 1902.pdf

DOCUMENT INFO

THE MINERAL INDUSTRY

ITS

STATISTICS, TECHNOLOGY AND TRADE

IN THE

UNITED STATES AND OTHER COUNTRIES

TO THE END OF

1902

FOUNDED BY THE LATE

RICHARD P. ROTHWELL

EDITED BY

JOSEPH STRUTHERS, PH.D

VOL. XI

SUPPLEMENTING VOLUMES I TO X

NEW YORK AND LONDON
THE ENGINEERING AND MINING JOURNAL
1903

EPA7-002007

A Review of Progress in the Metallurgy of Zinc in 1902.

By Walter Renton Ingalls.

The prices for ore and metal which prevailed during a large part of 1902 enabled American smelters to realize satisfactory returns. They utilized to the full extent their already large capacity and still further increased their means. Early in the spring the new works of A. B. Cockerill and the Standard Acid Co., each three-block plants in the Iola district, were put in operation. The works of the latter were soon afterward purchased by the interests that had been operating the Southwestern Chemical Works at Argentine, Kan., and the two were consolidated under the name of the United Zinc & Chemical Co. This company makes sulphuric acid from the gases given off in blende roasting, and is the first concern west of the Mississippi to undertake that process. In May the New Jersey Zinc Co. purchased the plants of A. B. Cockerill and the Prime Western Spelter Co. at Gas, near Iola, and later bought the works of George E. Nicholson at Nevada, Mo., and Iola, Kan. The works at Nevada, which uses coal as fuel, have been closed, and the three in the gas field are operated under the name of the New Prime Western Spelter Co. A new plant of three blocks, erected by the Lanyon Brothers Spelter Co., at Neodesha, Kan., was put in partial operation during July, and was completed about the end of November. Construction was begun on the works of the United States Zinc Co., affiliated with the American Smelting & Refining Co., at Pueblo, Colo., and it is expected that this will be in operation in 1903. There is now but little Western spelter produced outside of the natural gas districts of Kansas, and the large plants at Lasalle-Peru, Ill. The recent prices for ore and spelter afforded such a margin, however, that some of the old direct-coal-fired furnaces could be run profitably, and during the second half of 1902, the plant at Collinsville, Ill., was put again into commission, while the Edgar Works at St. Louis, Mo., continued in steady operation. A plant at Sandoval, Ill., was operated by the Sandoval Zinc Co. The rolling mill of the Lanyon Zinc Co., at Laharpe, Kan. (near Iola), was put in operation during 1902, and the Cherokee-Lanyon Spelter Co. erected and blew in a small lead blast furnace to smelt the lead and silver-bearing residues remaining after the distillation of Colorado zinc ore in Sadtler retorts, which are now used by that company to the exclusion of all others, refractory ore alone being distilled.

Theoretical.—The principles governing the reduction of zinc oxide by carbon have been discussed from the standpoint of modern physical chemistry by G. Bodlaender, in a masterly paper,[1] which is too long and complex for satisfactory abstract.

Physical Properties.—Ernest A. Lewis[2] has examined the microstructure of zinc, pure and contaminated with 0·5% of an impurity, added intentionally. Pure zinc consists of large primary crystalline grains, and inside the primary crystals, on deeper etching, are seen secondary crystals. The fractured surface shows brilliant, large, bluish-white crystals. Zinc containing 0·5% Pb consists

[1] *Zeitschrift fuer Elektrochemie*, VIII., xliv., 883 to 943, Oct. 30, 1902.

[2] *Chemical News*, LXXXVI., 211, Oct. 31, 1902; *Engineering and Mining Journal*, Dec. 20, 1902.

EPA7-002008

DOCUMENT INFO

EDFolder: D:\Question 09\Presentation Cited Docs\Prime Western\

Filename: 1902-04-29 Cockerill Deed.pdf

DOCUMENT INFO

TITLE DOCUMENT 9

GRANTOR:	Cockerill, A.B. and Mary M.
GRANTEE:	Cox, Mark T.
INSTRUMENT:	Warranty Deed
DATE:	04/29/1902
BOOK:	27
PAGE:	557
PARCELS:	3

the said premises are free and clear of any incumbrances done or suffered by him or those under whom he claims; and that they will warrant and defend the title of the said premises unto the said party of the second part, and unto her heirs and assigns forever, against the lawful claims and demands of all persons whomsoever.

In Witness Whereof, the said parties of the first part have hereunto set their hands and seals the day and year first above written.

M. B. Fairfield (seal)
Mrs Effie Fairfield (seal)

State of Missouri, } ss:
County of Jasper, }

On this 1st day of May A. D. 1902 before me personally appeared M. B. Fairfield and Effie Fairfield his wife, to me known to be the persons described in and who executed the foregoing instrument and acknowledged that they executed the same as their free act and deed.

In Testimony Whereof, I have hereunto set my hand and affixed my official seal at my office in Jasper Mo. the day and year first above written.

My term of office as Notary Public will expire Oct. 24th A. D. 1902.

A. A. Lynch
Notary Public

Filed May 6th 1902 at 8 A. M.
by Ernie Perkins
Deputy

N. P. Fowler
Register of Deeds

This Indenture, Made this 29th day of April in the year of our Lord, One thousand nine hundred and two, Between A. B. Cockrill and Mary M. Cockrill his wife of Nevada in the County of Vernon and State of Missouri of the first part, and Mark P. Cox of East Orange Essex County State of New Jersey of the second part:

Witnesseth, That the said parties of the first part, in consideration of the sum of One Hundred Dollars and other valuable considerations to them duly paid have sold, and by these presents do grant and convey to said party of the second part, his heirs and assigns all that tract or parcel of land, situate in the State of Kansas and described as follows to-wit:

EPA7-002010

Beginning at a point Eleven hundred and five (1105) feet West of the North East corner of the South East quarter (¼) of section thirty-two (32), Township twenty four (24), Range nineteen (19), thence running west thirteen and One-half (13½) chains, thence south ten and thirty-eight one-hundredths (10.38) chains, thence East thirteen and One-half (13½) chains, thence north ten and thirty-eight one-hundredths (10.38), chains to point of beginning; containing fourteen (14) acres more or less, excepting right of way of Missouri Pacific Railway, and reserving all right to build pipe line as per contract with the Prime Western Spelter Company and the Cherokee Lanyon Spelter Company with the appurtenances, and all the estate, title and interest of the said parties of the first part therein. And the said parties of the first part do hereby covenant and agree that at the delivery hereof they are the lawful owners of the premises above granted and seized of a good and indefeasible estate of inheritance therein, free and clear of all incumbrances and that they will warrant and defend the same in the quiet and peaceable possession of the said party of the second part his heirs and assigns forever, against all persons lawfully claiming the same.

In Witness Whereof, The said parties of the first part have hereunto set their hands and seals the day and year above written.

Signed, Sealed and Delivered in the presence of

A. B. Lockerill seal

Mary M. Lockerill seal

U. S. R. S. CANCELLED 6: 6/29

State of Missouri, } ss
County of Vernon, }

Be it Remembered, That on this twenty-ninth day of April, A. D., 1902 before me a Notary Public in and for said County, came A. B. Lockerill and Mary M. Lockerill his wife, to me personally known to be the same persons who executed the foregoing instrument, and duly acknowledged the execution of the same.

In Witness Whereof, I have hereunto subscribed my name and affixed my official seal, on the day and year last above written.

Elsie J. Blue
Notary Public

My commission expires April 30th 1904

Filed May 6th 1902 at 6 A.M.

N. A. Fowler
Register of Deeds

EPA7-002011

DOCUMENT INFO

EDFolder: D:\Question 09\Presentation Cited Docs\Prime Western\

Filename: 1902-05-03 NJ Zinc absorbs Gas City smelters.pdf

DOCUMENT INFO

The Iola Daily Regis

LUME V. NO. 163. WHOLE NO. 1410 IOLA KANSAS, SATURDAY EVENING, MAY 3, 1902

FRAID OF THE BILL

ehood Measure Meets Opposition

licans Think the New States Would Send Democratic Senators

WILL PASS THE HOUSE

Will Probably be Tied up in the Senate

al Other Very Important easures are up for Consideration Next Week

ipps-McRae Press Association.

shington, May 3.—After District olumbia business Monday the will begin the consideration of nnibus bill admitting Oklahoma,

MAY MOVE SHOPS

Union Pacific May Locate Them at Topeka.

Kansas City, May 3—A dispatch from Topeka says that the Union Pacific Railroad company has under consideration a plan to remove its shops from Kansas City, Kas., to that city. While no report of this kind has been received by officials of the Union Pacific in Kansas City, Kas., the story is given some credence. The Union Pacific claims that it is continually hampered in Wyandotte county on account of the tax question, while it is almost certain that the road would be relieved of taxation by the Shawnee county official, if it were to remove its shops to Topeka. Another thing, the shops will soon have to be rebuilt. The present shops have been standing for years. The shops could be rebuilt in Topeka as easily as in Kansas City, Kas., and the only inconvenience would be the removing of the machinery, which would not be a great task.

The Topeka Commercial Club has already taken the matter up and will probably offer inducements to the Union Pacific to remove to that city.

The Union Pacific shops and repair

FIRED ON THE TROOPS

Situation Threatening in the Philippines

General Davis Cables that his Ultimatum has not Been Answered as yet

MORO FORT WAS SHELLED

It was Strongly Defended by 300 Men

Lieutenant Wagner Was Seriously Injured Besides Two Other Officers

By Scripps-McRae Press Ass'n.

Manila, May 3.—The situation at the island of Mindanao is more threatening today General Davis cables from his headquarters in the field that

A Swell

Cheer

Our

For a Fa

For he K

Tailor

Give him better satisfa

SUI

For Men .....

For Boys .....

EPA7-002012

NEW JERSEY ZINC CO.

One of the Biggest Concerns in the Country Invests in Land and Factories Here.

ABSORBS GAS CITY SMELTERS

Two of the Works Bought, Together With Lots of Gas Land—Already Enlarging the Plants.

Not since the day that the Lanyon Zinc Company was formed and bought three plants in this field has so important a deal been made as has just been consummated, whereby the New Jersey Zinc Company becomes the owner of two smelters at Gas City and large holdings of gas land. The company has millions of capital and has already begun work on large extensions.

Like all big business transactions, much time has been consumed in the transfer and vague hints of the sale have leaked out. Representatives of the New Jersey company visited this [illegible] year and carefully looked the ground over. The company considered the matter carefully and when representatives arrived this week they came to act.

The properties absorbed are the Prime Western smelter, and the A. B. Cockerill smelter. Each of these plants consists of three blocks of furnaces, so that six blocks go to the new company. They are grouped closely together in the south part of Gas City and can be easily operated together, making one of the largest concerns in the field.

The New Jersey Zinc Company is one of the oldest and probably the richest zinc smelting company in the United States. It has millions of capital and operates smelters in Pennsylvania, Wisconsin, Illinois and at Joplin, Missouri. It also controls the valuable zinc mining property, acid works, rolling mills and all the equipment of a complete zinc manufacturing institution.

One of the most significant indications of the policy of the new factor in Allen county prosperity is the energy with which work is being done. There was abundant delay in deciding to buy in this field, but already, even before the papers have been filed which record the transfers, stakes have been driven and ground broken, for the construction of two additional blocks of furnaces adjoining the A. B. Cockerill works. That will increase the plant to eleven blocks and there is no reason to believe that the extensions will end there.

It is reliably reported, that Mr. A. B. Cockerill will be manager of the Allen county works. He is an expert in this line, having spent years in the business and being thoroughly posted on every branch of the work. He is known by every man who ever dealt with him or worked for him as a prince of good fellows and a gentleman whose word is taken with the same trust that one accepts a government bond. That he is to have charge insures a liberal, friendly and progressive policy and the news will be welcome.

In addition to the purchase of the two plants the new company has made extensive purchases of gas land. And it is well. With two large and powerful companies in control the fuel will be protected and not wasted, there will be no break-downs from lack of capital, work will be steady, extensions made as rapidly as the markets demand and it seems certain that Allen county factories will soon be the dominant factor in the spelter markets of the country if not the world. The REGISTER honestly be-

EPA7-002013

A. B. crease l there he ex- Mr. A. of the expert in the posted He is dealt as a gentle- ith the overn- charge d pro- will be of the s made land. ge and ol the vasted, from steady, as the certain l soon spelter ot the ly be

lieves that it is a mighty fine thing for the industrial stability of this section and that it insures the investment of millions which will remain here permanently, coal being substituted for fuel in that uncertain and far distant day when natural gas shall no longer be available.

Allen county points with pride to the Lanyon Zinc Company and the New Jersey Zinc Company—without forgetting or over-looking the other valuable and immense manufacturing interests here---as proofs of the lasting prosperity which has come to stay.

Since the above was written a REGISTER reporter had the pleasure of meeting the gentlemen here. They are Mr. Cobb, secretary, Mr. Wardner, treasurer, and Mr. Mower, the last manager of the Empire Zinc Works at Joplin.

The gentlemen gave out the following information in addition to that above. The company bought some time ago and owns the Fulton 160 southwest of Gas City and has secured the Sleeper 160 east of Iola from the Northrups. At Palmerton, New Jersey, the company owns and operates probably the largest zinc mines in the world, producing as much as the whole Joplin district.

The gentlemen are well pleased with their purchases and with the outlook for the future, but were reticent of promising developments which may not materialize.

Officials Talk of New Plug

Topeka State Journal: There is some talk of a new Santa Fe plug from Chanute to Kansas city, similar to the plug which now runs from Topeka to Kansas City and from Emporia to Kansas City. The proposed train would go to Kansas City in the morning at 7:45 and return to Chanute about 9 in the evening.

An application for such a train was made some time ago by the people living on that part of the road, and the passenger department officials are looking into the matter. W. J. Black, general passenger agent, stated today that he is securing information in regard to the possibility of such a train being a paying proposition, but that nothing has so far been decided.

The Katy Leads.

The Katy leads and others follow. If you want to be in the lead Sunday go to Kansas City over the M. K. & T. You can leave here at 3:15 a. m. and be there at 7:20 or you can wait till 9:35 and arrive in Kansas City at 12:25. This last train will make no stops between Moran and Kansas City.

Whooping Cough.

A woman who has had experience with this disease, tells how to prevent any dangerous consequences from it. She says: Our three children took whooping cough last summer, our baby boy being only three months old and owing to our giving them Chamberlain's Cough Remedy they lost none of their plumpness and came out in much better health than other children whose parents did not use this remedy. Our oldest little girl would call lustily for cough syrup between whoops. — JESSIE PINKIE HALL, Springville, Ala. This remedy is for sale by W. L. Crabb & Co. and Campbell & Burrell.

Important

Persons having sidewalks built of brick, stone or cement should not accept or pay for them until approved by the street and alley committee of the city council.

BY ORDER OF COMMITTE.

Knights Templar, Attention -

The Knights Templar of Iola and vicinity are urgently requested to meet at the Masonic Temple. Wednesday evening, the 7th at 8 o'clock sharp for the purpose of taking the necessary steps preparatory to instituting a Commandery at Iola. It is hoped and expected that every Sir Knight will attend this meeting

EPA7-002014

DOCUMENT INFO

EDFolder: D:\Question 09\Presentation Cited Docs\Prime Western\

Filename: 1902-05-04 Prime Western.pdf

DOCUMENT INFO

Prime Western Smelters Works Sale.
Special to The New York Times.
New York Times (1857-Current file): May 4, 1902; ProQuest Historical Newspapers The New York Times (1851 - 2005)
pg. 1

Prime Western Smelters Works Sale.

Special to The New York Times.

NEVADA, Mo., May 3.—A Mr. Cox of New Jersey has purchased a large interest in the Prime Western Smelters Works of Iola, Kan., and the A. B. Cockrill plant at Gas City. The reported consideration is $200,000. The Prime Western is owned by A. J. Daly, A. B. Cockrill, and Dr. L. H. Callaway of this city. The plant at Gas City is owned by A. B. Cockrill. The rumor here is that the New Jersey Zinc Company syndicate is behind Mr. Cox. It has been known for some time that the syndicate has been trying to get options on these smelters.

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DOCUMENT INFO

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Filename: 1902-06-10 Nicholson Smelter sold to NJ Zinc.pdf

DOCUMENT INFO

The Iola Daily Regis

VOLUME V. NO. 195. WHOLE NO. 1442 | IOLA KANSAS, TUESDAY, EVENING JUNE 10, 1902

HE LAST CHANCE

ly One Hope for Settlement of the Strike

Mitchell's Conference With Wright Avails Nothing It's all Off

BE A FIGHT TO THE FINISH

llieries are Building Living Quarters

e Railroads Have Agreed to Stand by the Demands of the Unions

Scripps-McRae Press Ass'n.

Wilkesbarre, June 10.—Hope will be centered in the settlement of the anthracite strike does not follow the conference of President Mitchell and Commissioner Wright. The ter is attending the graduating exercises at Tarrytown, N. Y., today is expecting to interview the railroad presidents this evening. Presi-

WELCOME TO WARE

Grand Army Men Honor New Pension Commissioner

Washington, June 9.—A jolly party was entertained last night at River View by the Archons in honor of Pension Commissioner Ware, of Kansas. Sunflowers bloomed on the banquet table, where the Grand Army men drank to the health of the new commissioner, who was decorated with a Kansas posy large enough to have concealed half a dozen Topsies.

The Archons are the Grand Army men who have served as department commanders of the Potomac. They number nineteen, and all but six of them were present last night to do honor to Colonel Ware. Forty invited guests also attended the banquet. The party left the Seventh street wharf on the Samuel J. Pentz at 6:30 p. m. and returned to Washington at midnight. Army songs were sung and rousing army speeches were made by the veterans while at River View and on the way back from the resort. As the Samuel J. Pentz steamed into the wharf the veterans sang "John Brown's Body Lies Moldering in the Grave."

NO STOCK YARDS STRIKE

In Chicago the Company Yielded and

CONVICTS PARDONED

Palma Turns all Americans Loose in Cuba

This Covers the Cases of Those Convicted of Complicity in the Postal Frauds

RATHBONE WANTS ACQUITTAL

A Pardon Isn't Good Enough for Him

Thousands of Paupers Surrounded the Palace Crying for Bread

By Scripps-McRae Press Ass'n.

Havana, June 10—President Palma signed an amnesty act today pardoning all Americans and expiating offenses committed in Cuba. Neeley, Rathbone and the postal fraud convicts will be released tomorrow. Rathbone is the third man convicted and he hesitates to accept freedom, declaring that acquittal alone is accept-

A MAGNIF RAC

NEARLY FIVE YEARS AGO we enter that time We have entered some fine m The people have backed the FAMOUS all stretch, showing that splendid grit and determ Leader, giving our backers something back f VALUES at MATCHLESS PRICES, gainin every sale made.

Tomorrow We Start A SURE W

PANTS

$2.00

EPA7-002016

NICHOLSON SMELTER SOLD

New Jersey Zinc Company Acquires Property, Giving Them Large Works—Mr. Nicholson Will Leave

Negotiations commenced in May here terminated today when Mr. George E. Nicholson sold his smelter in east Iola, together with his Nevada, Mo., works to the New Jersey Zinc Company. The plant here will be operated in connection with the Gas City properties acquired some time ago and will be managed by Mr. A. B. Cockerill.

The plant here was started on a small scale some three years ago by Mr. Nicholson, who had previously previously been engaged in the business at Nevada, Mo. As he made money he reinvested it until the present works here consisted of five blocks of furnaces, one of the largest individual plants in this section The Nevada works has six blocks of smelters and Belgian coal is used. It is not known whether that plant will be operated or not, but Mr. Nicholson insisted on including it in the deal. He bought fifteen acres of land east of the Iola plant from the Northrups and it goes to the New Jersey Company also. His handsome new residence in the east part of town is included in the deal. Mr. Nicholson has leased a cottage at Bay View, Michigan, and will go there at once with his family to spend the summer, it being his first holiday in fifteen years.

By the purchase the New Jersey Company will own in this section as large works as does the Lanyon Zinc Company, as soon as the extensions now building are completed. Mr. Nicholson expressed the opinion that under ordinary circumstances it was best to have numerous individual plants, but he thought that as the situation exists here the consolidation is for the best. The company now owns the old Prime Western works and the A. B. Cockerill smelter at Gas City and the Nicholson works here. It owns considerable fine gas land and millions of capital back of it to insure its permanency. The new management will take charge of the plant on July 1.

First District Comissioner.

Mr. William Cunningham is in the [illegible] for the nomination for

son, W. H. Holmes, accompanied the body to Pittsburg.

Mrs. Frank Knatt, a daughter of J. L. Brown, who formerly lived on the Smeltzer farm north-east of Iola and now resides on north Washington avenue in this city, died this morning of inflamation of the bowels at the home near Moran. The funeral will be held at Moran tomorrow. The remains will be brought here tomorrow afternoon and the burial services held at the cemetery. Rev. Shuey will officiate. She leaves three children to mourn her loss.

Caught in the Current

What came near being a serious accident happened down near the fair grounds this afternoon. Three boys were playing out in the corn field north of the grounds and in some way Ralph Shuey got out in the current on a piece of sidewalk. It was so strong he could not work his way out, and the swiftly flowing river carried him rapidly down stream. Some of the men from the Cement plant saw him and started after him in a boat. Mr. Curtis finally overtook him and rescued him just opposite Captain Ewing's house. When taken out he was just able to keep his head above the water and would never have been able to work his way out himself. It was a serious call and should be a warning to people who are inclined to be venturesome.

SANITARY COP IS NAMED

Council Will Clean Up—Many Sidewalks Condemned—Paving Talk.

The city council met last night pursuant to adjournment.

The water and light committee reported verbally on the probable cost of a new chimney for the power house to permit the enlarging of the plant.

The mayor was empowered to appoint a committee of two from the council to visit Kansas City, accompanied by Mr. Bott, city electrician, to examine machinery and make arrangements for enlarging the light plant. Councilmen W. S. Hurlock and C. M. Thompson were appointed.

A resolution condemning certain walks in town, ordering them removed and new ones laid, was passed. The walks are either old and worn out or have been laid contrary to ordinance. The properties concerned are:

CHANUTE NOT IN THE G

Coffeyville Citizens Declined to P That Town to Drop Out of th Ball League.

When the Coffeyville team Missouri Valley League lost g the town laid down and did not pa ize the games. The result was the funds on hand were quickl hausted and finally Larry Power manager, left town unceremonic There was no cash in the treasur it looked like the team would ha quit. The merchants, however, p enough money for the team to the Springfield, Jefferson City Sedalia trip, from which the tea turns today. Chanute immed got after the franchise and ask have it transferred to that town there seemed a certainty that transfer would be made as mone on hand to post the $200 forfeit. ident Shiveley, however, with his tomary fairness, gave Coffeyvill time to reflect and decide whethe was willing to be dropped. An citizens said an emphatic "no." have put up the delinquent $20 do not intend to let their rival, nute, do something that they failed in. So the Coffeyville tean report again at Coffeyville and nute will remain out in the wet, any vacancies occur they have promised to Chanute.

So far as Iola is concerned it been hoped Chanute would get in railroad jump would save mon all the clubs and the town r would have intensified the intere the game whenever the two teams together. But if a team drops Jefferson City should be it, for 100 miles off to one side from th of the league and the swing over depletes every club's treasury $1 more.

Chased by a Freight Train

Among the many sight-seers visited the river last evening wa Lavitska, a shoe-maker. He, w crowd of men, chose the Mis Pacific track as a means of rea the river. The track is surrou by water right up to the rails an nearly half a mile one step off th of the ties will precipitate one int feet of water.

It so happened [illegible] th freight train made the trip we

EPA7-002017

DOCUMENT INFO

EDFolder: D:\Question 09\Presentation Cited Docs\Prime Western\

Filename: 1902-11-04 US Patent 712502 DeSalles Furnace.pdf

DOCUMENT INFO

No. 712,502. Patented Nov. 4, 1902.

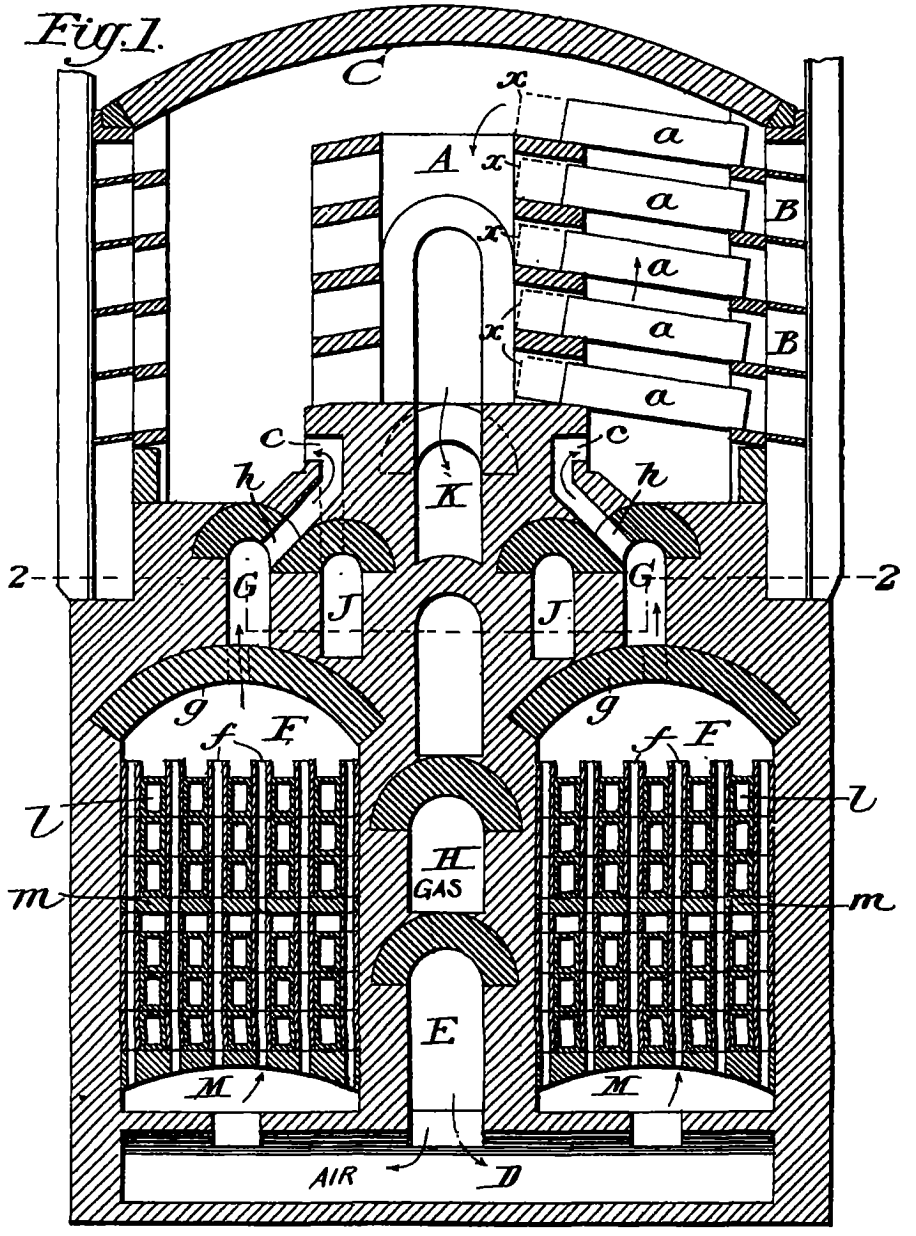
G. G. CONVERS & A. B. DE SAULLES.

MUFFLE FURNACE.

(Application filed Aug. 27, 1901.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



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No. 712,502. Patented Nov. 4, 1902.

G. G. CONVERS & A. B. DE SAULLES.

MUFFLE FURNACE.

(Application filed Aug. 27, 1901.)

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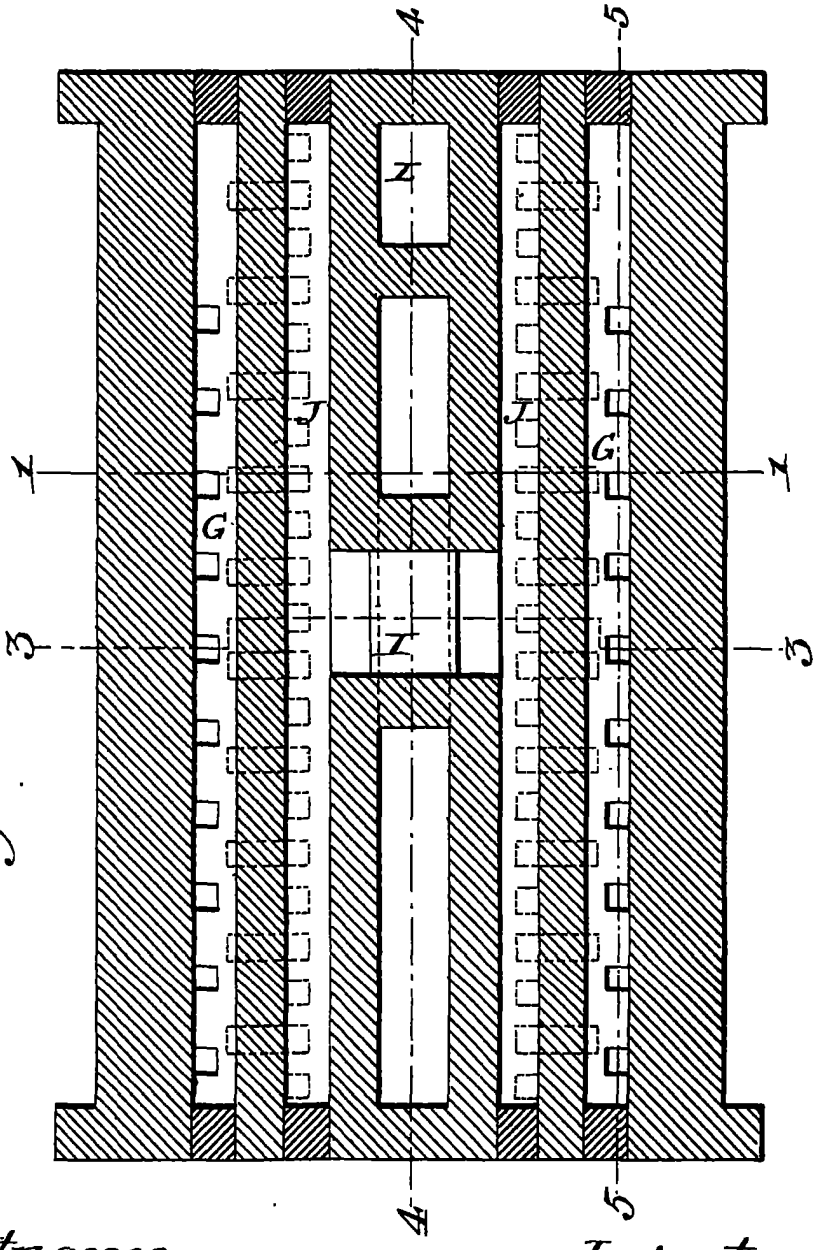

Fig. 2.

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EPA7-002019

No. 712,502. Patented Nov. 4, 1902.

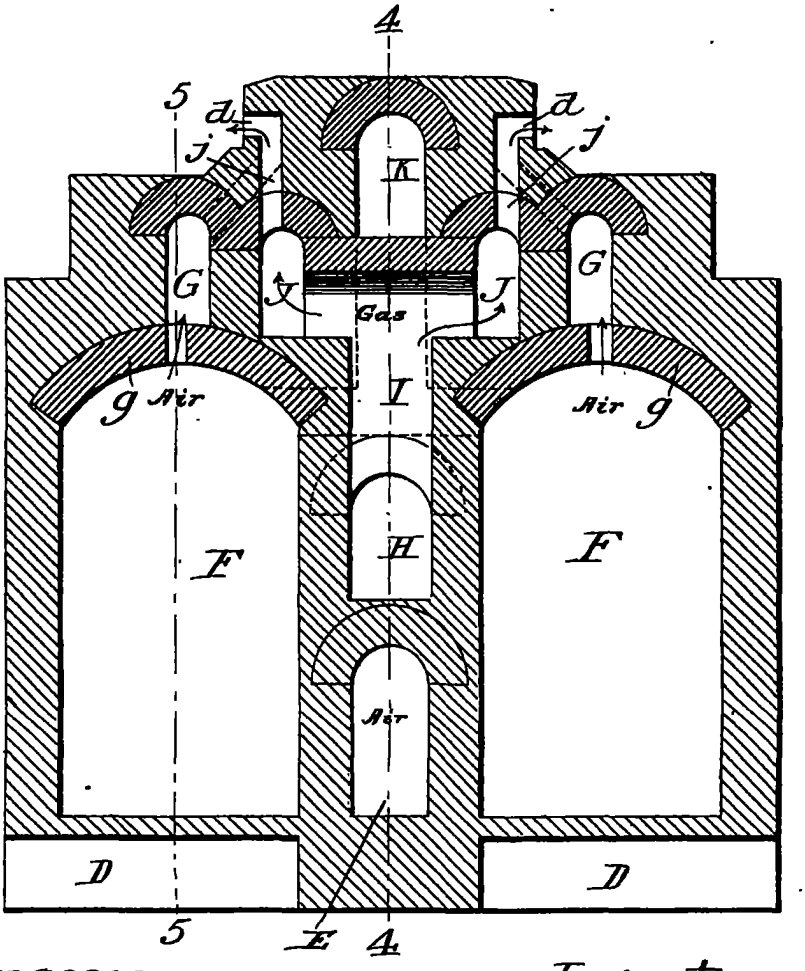
G. G. CONVERS & A. B. DE SAULLES.

MUFFLE FURNACE.

(Application filed Aug. 27, 1901.)

(No Model.) 5 Sheets—Sheet 3.

Fig. 3.



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No. 712,502. Patented Nov. 4, 1902.

G. G. CONVERS & A. B. DE SAULLES.

MUFFLE FURNACE.

(Application filed Aug. 27, 1901.)

(No Model.) 5 Sheets—Sheet 4.

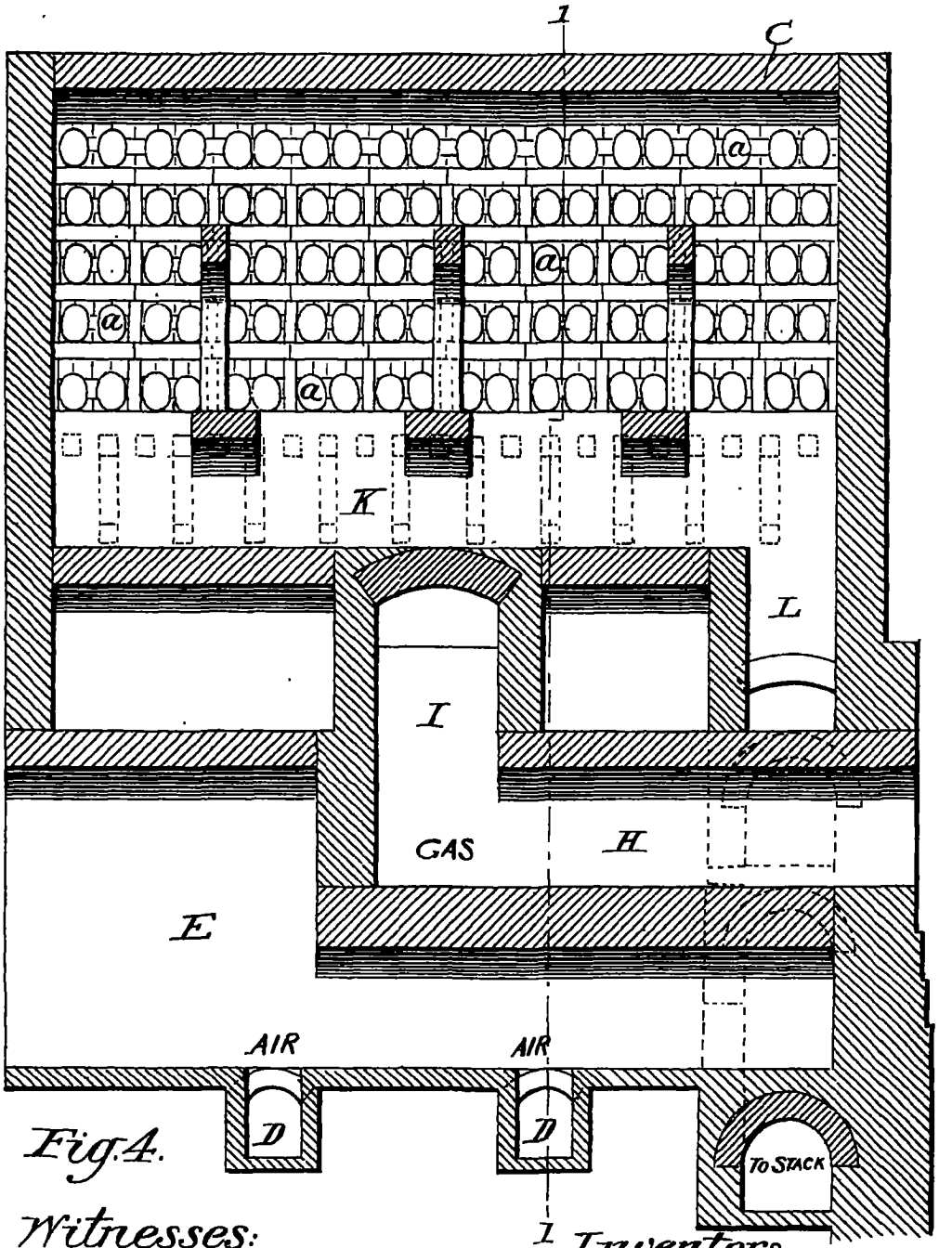

Fig. 4.

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No. 712,502. Patented Nov. 4, 1902.

G. G. CONVERS & A. B. DE SAULLES.

MUFFLE FURNACE.

(Application filed Aug. 27, 1901.)

(No Model.) 5 Sheets—Sheet 5.

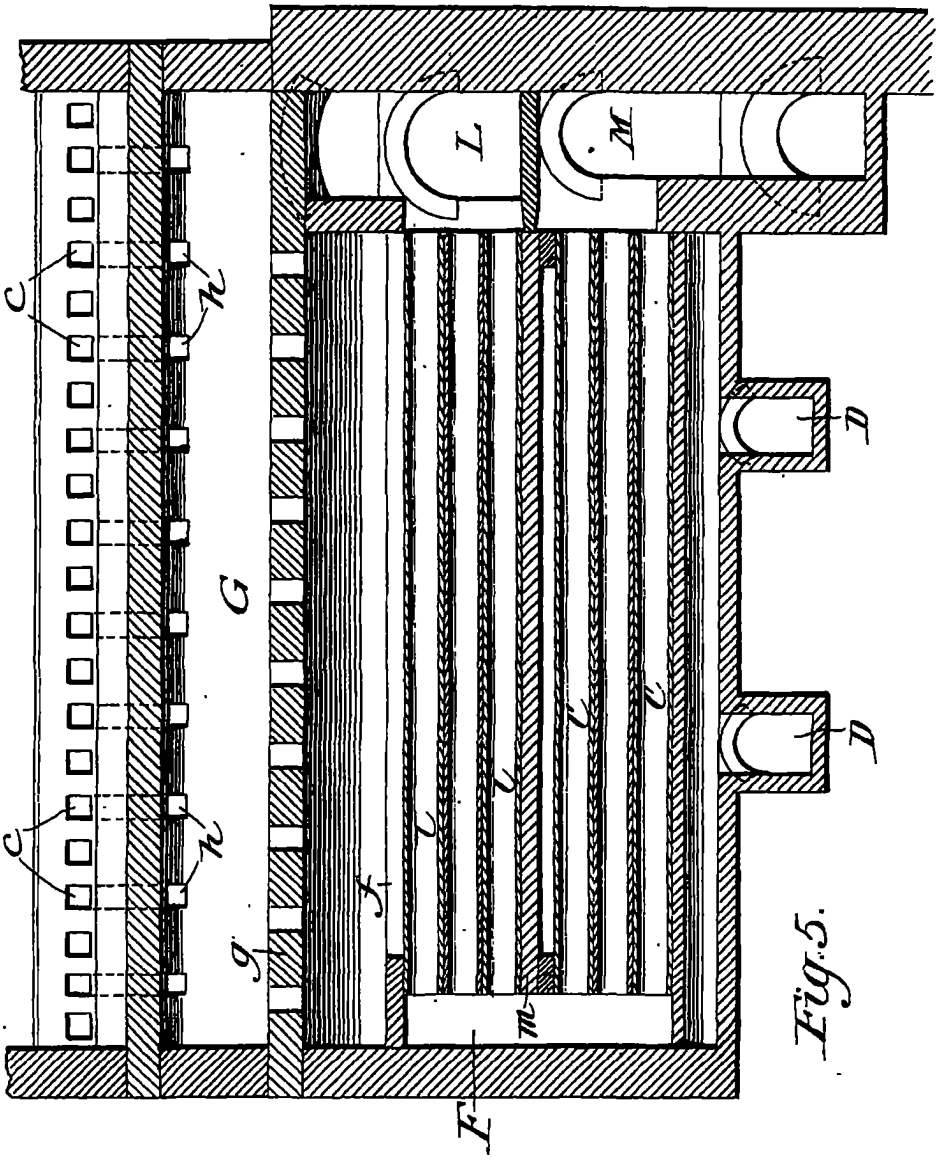

Fig. 5.

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EPA7-002022

UNITED STATES PATENT OFFICE.

GEORGE G. CONVERS AND ARTHUR B. DE SAULLES, OF SOUTH BETHLEHEM, PENNSYLVANIA.

MUFFLE-FURNACE.

SPECIFICATION forming part of Letters Patent No. 712,502, dated November 4, 1902.

Application filed August 27, 1901. Serial No. 73,453. (No model.)

To all whom it may concern:

Be it known that we, GEORGE G. CONVERS and ARTHUR B. DE SAULLES, citizens of the United States, residing at South Bethlehem, Northampton county, State of Pennsylvania, have invented certain new and useful Improvements in Retort or Muffle Furnaces; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to certain new and useful improvements in furnaces designed principally for heating retorts used in the metallurgy of zinc, and is designed to provide a construction and arrangement of parts whereby the retorts are heated in a continuous manner by products of combustion, which rise through the retort-chambers from the bottom to the top thereof and have their exit through a central downtake, being utilized on their way to the chimney-stack for preheating the incoming air and fuel-gas. The arrangement is such that the retorts are heated not only continuously, but with great uniformity throughout their lengths, a main characteristic feature being that the rear ends of the retorts are freely exposed to the furnace heat.

In practice we have ascertained that the operation of a furnace constructed in accordance with our invention is accompanied with a notable increase in the output of metallic zinc or spelter, a considerable saving in fuel, and a marked decrease in the loss of retorts or muffles incident to the usual forms of Belgian furnaces.

In the accompanying drawings, Figure 1 represents a vertical section of a furnace embodying our invention, taken on a plane indicated by the line 1 1 of Fig. 2. Fig. 2 represents a horizontal section taken on a plane indicated by the line 2 2 of Fig. 1. Fig. 3 represents a vertical section of that part of the furnace below the retort-chambers, taken on the line 3 3 of Fig. 2. Fig. 4 represents a vertical section on the line 4 4 of Figs. 2 and 3, and Fig. 5 represents a section on the line 5 5 of Figs. 2 and 3.

Similar letters of reference indicate similar parts throughout the several views.

Upon reference to the drawings it will be noted that the main or principal elements of the furnace consist of retort-chambers located on either side of a central downtake and a subjacent regenerator in which the incoming air and gas are preheated and through which the products of combustion from the downtake pass on their way to the chimney-stack. For convenience of illustration we have omitted from one of the retort-chambers the removable spelter-muffles adapted to be placed therein and have shown them in but one of said retort chambers or compartments. For like reasons we have omitted to include in certain of the views the illustration of the brickwork filling of the regenerating-chambers, inasmuch as its construction and arrangement are familiar to those skilled in the art.

The spelter retorts or muffles *a*, as indicated, for instance, in the right-hand compartment or retort-chamber, (see Fig. 1,) are supported in the usual inclined position upon shelves on either side of the central downtake A and upon corresponding shelves of the outer walls B B, the retort chambers or compartments being spanned by the vaulted roof or arch C. The spelter retorts or muffles are indicated in the drawings in outline merely; but it will be understood that they are to be provided at their outer ends with the usual condensers and prolongs and are to be luted at said outer ends in the usual manner to prevent the ingress of air in the manner customary to the working of Belgian furnaces for the metallurgy of zinc. They may be of any preferred length and cross-section and may be supported at their inner ends, as shown in full lines, or have these ends extended to the edge of the downtake for the waste products, as denoted by the dotted lines *x*. At the base of each of the retort compartments or chambers is located a longitudinal series of air-inlet openings *c* and a corresponding series of fuel-gas-inlet openings *d*, the two sets of openings alternating with each other throughout the length of the retort compartments or chambers, so as to ob-

EPA7-002023

tain a regular and uniform combustion of the gas at its entrance into the said compartments.

The incoming air entering the gallery E, Fig. 4, passes from the feeder-flues D into the air-regenerator chambers F and passes upwardly through the perforated bricks *f* thereof, (see Fig. 1,) through the perforated arches *g* into the air-distributing chambers G, from which a series of inclined passages *h* conduct it to the air-inlet ports *c*. The gas from the producers entering the gallery H (see Fig. 4) passes through the uptake I into the gas-distributing chambers J, and thence by the passages *j* to the fuel-gas outlets *d*.

The waste products of combustion from the downtake A enter the horizontal flue K and pass along intermediate of the gas-distributing chambers J, finally entering the air-regenerator chambers by way of the downtake L, from which they are distributed to the right and left into the air-regenerators F, as indicated in Figs. 1 and 5. In passing through the air-regenerator chambers the products of combustion pass through the three upper series of hollow horizontal tiles *l* to the end of the regenerator-chamber, and thence downwardly and in the opposite direction through the three corresponding series of hollow horizontal tiles *l'* below the partition *m* of said chambers, finally entering the flue M, from which they are led off to the chimney-stack.

The operation of the furnace is as follows: The incoming air on its passage through the regenerator-chambers F is highly heated by the products of combustion on their passage through the horizontal flues of said chambers and arrives at the outlet-ports *c* at the temperature appropriate to the operation. In like manner the gas entering from the producers finds itself distributed in the chambers J between the air-regenerators and the flues for the outgoing products of combustion before the latter have entered the regenerator-chambers, in consequence whereof the gas itself is preheated to a very high degree, it being found that the temperature prevailing in the distributing-chambers J is so high that the brickwork of said chambers is raised to a cherry-red, almost if not quite equal to the temperature of the walls of the air-distributing chambers G. The preheated air and preheated gas at the high temperatures developed enter into combustion at the base of the retort compartments or chambers, and because of the draft of the central downtake the products of combustion, instead of being projected solely toward the outer ends of the retorts, are so acted upon that they distribute themselves with substantial uniformity over the entire length of the retorts in their upward passage through the retort-chambers. On their passage through the central downtake A, moreover, they heat the inner walls of said central downtake and also the inner ends or butts of the retorts or muffles, thereby further distributing and utilizing their heating effect to the advantage of the operation. On passing through the central downtake they follow the course hereinbefore described, finally issuing at the chimney-stack.

So far as we are aware it is broadly new in furnaces of this character to admit the products of combustion at the base of the retort-chambers and to cause them to pass upwardly through said chambers and downwardly through a central downtake in such manner as to distribute and utilize their heating effect in the way described. It is also broadly new, in so far as we are aware, to convey the waste products of combustion from the downtake on their way to the air-regenerator chambers in such manner that the gas-distributing chambers or flues shall be interposed between the air-regenerator chambers and the flues for said waste products of combustion on their way to the air-regenerators. We desire, therefore, that such of our claims as set forth these features generically shall have a correspondingly broad interpretation.

Having thus described our invention, what we claim is—

1. A retort-furnace provided with two retort chambers or compartments having air and gas inlets at their base and having a central downtake, said downtake extending throughout the length of the furnace between the retort-chambers; substantially as described.

2. A retort-furnace provided with two retort chambers or compartments having air and gas inlets at their base and having a central downtake, the walls of said downtake consisting of a series of shelves upon which the inner ends of the retorts are adapted to rest, said shelves being separated by open spaces, whereby the down-going products of combustion have access to the said inner ends of the retorts; substantially as described.

3. A retort-furnace provided with two retort chambers or compartments having air and gas inlets at their base and having a central downtake, said downtake extending throughout the length of the furnace between the retort-chambers, the said air and gas inlets being arranged in horizontal alternating series along the inner side of said retort chambers or compartments; substantially as described.

4. A retort-furnace provided with two retort chambers or compartments having air and gas inlet flues at their bases and having a central downtake for the products of combustion, air-regenerator chambers into which said downtake discharges, and gas-distributing chambers intermediate of the waste-product flues and said regenerators; substantially as described.

5. A retort-furnace provided with two retort chambers or compartments having gas

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and air inlet flues at their bases and having a central downtake, air-distributing chambers for said air-inlets, gas-distributing chambers for said gas-inlets, air-regenerator chambers supplying said air-distributing chambers, and a horizontal flue for waste products of combustion communicating with the central downtake and located between the gas-distributing chambers, said horizontal flue communicating with the heating-flues of the air-regenerator chambers; substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

GEORGE G. CONVERS.
ARTHUR B. DE SAULLES.

Witnesses:
A. L. COPE,
J. R. MILLER.

[redacted]

EPA7-002025

DOCUMENT INFO

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DOCUMENT INFO

FOREIGN CORPORATION

Dec 28 - 1922

Prime Western Spelter Co

Mo

PLACE OF BUSINESS:

Nevada

Mo

Sec. P No. 1

Capital $100 000

Admitted Nov - 10 - 04

W. Y. MORGAN,

EPA7-002026

Application for Authority to Engage in Business in the State of Kansas as a Foreign Corporation.

TO THE CHARTER BOARD OF THE STATE OF KANSAS:

The Prime Western Spelter Company, *a corporation organized under the laws of the State of* Missouri, *applies for permission to engage in business in the State of Kansas, and for that purpose submits the following statement, to wit:*

FIRST.

A certified copy of its Charter or Articles of Incorporation, which is filed herewith.

SECOND.

The place where the principal office or place of business of said corporation is located is Nevada, Missouri

THIRD.

The full nature and character of the business in which said corporation proposes to engage within the State of Kansas is the Smelting of Ores

EPA7-002027

FOURTH.

The names and addresses of the officers and trustees or directors are:

President:- S. B. Palmer, Princeton, New Jersey
Vice President:- Wm P. Hardenbergh, Bernardsville, New Jersey
Treasurer:- Henry L. Hardcastle, New York City, New York
Secretary:- A. P. Cobb, Tarrytown, New York
General Manager: R. T. McRae, Iola, Kansas

Directors:

A. E. Spencer, Joplin, Missouri
Daniel Dwyer, do.
H. B. Bird, do.
Wm P. Hardenbergh, Bernardsville, New Jersey
August Heckscher, Huntington, New York
S. B. Palmer, Princeton, New Jersey
A. P. Cobb, Tarrytown, New York

FIFTH.

RESOURCES.	Dollars.	Cts.	LIABILITIES.	Dollars,	Cts.
Bills receivable,		90	Capital paid up,	100000	-
Real estate, original cost	458395	19	Surplus,	101590	-
Personal property,	195404	94	Undivided profits,	1160674	7
Stocks, bonds, and other securities, - cost	8000	-	Bills payable,		
Merchandise,	3118609	8	Accounts payable,	475638	8
Cash on hand,	274286	8	Bonded indebtedness,		
Due from banks,			Encumbrance on real estate or plant,		
Accounts receivable,	2307651	4	Loans, Invested in Real Estate and Plant	3508485	9
Judgments,					
Gas Lands and Pipe Lines at original cost	1878609	3	Loans, Invested in Material and Mineral Lands	4846916	6
			Reserve for depreciation and Repairs	2140442	6
TOTAL.	14148058	6	TOTAL.	14148058	6

SIXTH.

The amount of the capital stock of said corporation is One Hundred Thousand (100,000.) *Dollars, divided into* One Hundred (100) *Shares, of* One Thousand (1000) *Dollars each.*

We further state that the above application is made in good faith, with the intention that said corporation shall actually engage in the business specified, and none other.

EPA7-002028

State of New York, } ss.
New York County,

I, S. S. Palmer, President,
and I, A. P. Cobb, Secretary,
of the above-named corporation, do solemnly swear that the above is a full and complete statement of the resources and liabilities of said corporation, as shown by the books of the same, and that said statement and the several matters and things contained in this application are true in every particular, to the best of my knowledge and belief. So help me God.

S. S. Palmer, President.

A. P. Cobb, Secretary.

Subscribed and Sworn to before me, this 27th day

[SEAL.] of October, A. D. 1904

J. G. Walton
Notary Public. #125
New York Co.

(My commission expires March 30, 1906)

DOCUMENT INFO

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(ORGANIZED 1871)

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EPA7-002030

SUBJECT TO REVISION.

[TRANSACTIONS OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.]

The Zinc-Smelting Industry of the Middle West.

BY H. C. MEISTER, E M., ST. LOUIS, MO.

(Lake Superior Meeting, September, 1901.)*

General History.

The zinc-smelting industry of the United States has grown very rapidly in recent years and bids fair to outrival that of all other countries in the future. On account of the geographical situation of the chief ore-supplies, the industry may be divided into two main groups, the eastern and the western.

The eastern and older group includes the works of Pennsylvania, New Jersey and Virginia, which practically control their own ore-supply. The western group includes the works of Illinois, Missouri, Kansas, Wisconsin and Indiana, which do not control their own ore-supply, but are compelled to buy the ore in the open market. It is for this reason that the western zinc-smelting industry has been undergoing continual changes since its inception 40 years ago.

During the early discoveries of lead- and zinc-ore in the lead- and zinc-districts of Wisconsin and northern Illinois, the zinc-ore (smithsonite or "bone" as the miner calls it) had no value and was considered waste; but later, when this ore was found in large quantities, it attracted the attention of metallurgists, which finally resulted, during the early sixties, in the building of the Matthiessen & Hegeler Zinc Works at LaSalle, Ill., the pioneer zinc-works of the West.

A few years later, zinc-ore was discovered associated with the lead-ore in Jefferson county, southeastern Missouri, which started the industry at Carondelet or South St. Louis. Still later, the discoveries of zinc-ore in the lead-ore region, first at Granby and then around Joplin, lead to the introduction of the industry in the southwest Missouri and Kansas districts.

At first the development of the industry was slow, but it progressed steadily and it is now one of the leading metallurgical industries of the middle West.

* Presented at the supplementary session of the Institute in St. Louis, Mo.

EPA7-002031

As this paper deals solely with the local zinc-industry the western group only is described. For convenience this group may be subdivided into States according to the progress of the development of the industry, which formerly placed Illinois at the head of the list, then Missouri, and later Kansas and Indiana. This order is now changed and Kansas heads the list, with Illinois second and Missouri third.

In a general way it may be said that after the establishment of the industry at LaSalle, Ill., in the '60's, there were four distinct periods of activity and enlargement followed by corresponding periods of depression. During the early '70's three plants were built at Carondelet, Mo., but after the panic of 1873 business became bad and did not revive until 1879. Activity was renewed in the beginning of the '80's, and many works were built in Kansas and southwestern Missouri. About 1885 a period of depression set in, followed by a very active period of construction during the early '90's. After 1895 a period of dulness occurred, which lasted until 1898, when the activity was once more revived by the building of a number of large plants in the Kansas natural-gas district. Since that time development in this district has been so rapid that a shortage of ore soon occurred. In 1899 the ore-supply was insufficient, and the resultant keen competition caused the price of blende to advance to the unprecedented figure of $54 per ton. The gas-smelters having a strong advantage over the old coal-smelters in the cost of production, the severe competition soon caused the closing down of all the coal-smelters in the Kansas and southwestern Missouri districts. The zinc-ores mined in connection with western silver- and gold-ores, however, soon relieved the shortage, and for the last four years large quantities of blende have been shipped from Colorado to Kansas for treatment in the natural-gas plants.

Production of Metallic Zinc in the United States.

The following statistics[1] show the rapidity with which the production of spelter increased with the application of natural gas.

[1] *Mineral Resources of the United States* for 1892, U. S. Geological Survey.

	Short Tons.		Short Tons.
1895,	76,505	1900,	113,859
1896,	70,933	1901,	130,174
1897,	89,397	1902,	117,541
1898,	107,768	1903,	145,670
1899,	121,216		

An addition of 10,000 short tons for the eastern and southern districts represents the total production of the entire country for the years quoted.

Roasting Zinc-Ore.

Most of the zinc-ore now mined in this district is zinc sulphide or blende, hence a preliminary roasting is necessary in order to get rid of the sulphur. The more thorough the elimination of the sulphur during the roasting, the better the chances are for the recovery of the zinc in the subsequent smelting-operation. Each unit of sulphur left in the roasted ore will hold back double its weight of zinc, and as no sulphur by-products (such as matte) are formed in the smelting-operation, the loss by sulphur means so much waste in the residues which cannot be recovered. A variety of mechanical furnaces are used for roasting, although the old style hand-rabbled reverberatory furnaces are still in use at many plants.

The Hegeler Acid-Furnace.—Many years ago the Hegeler muffle-type of mechanically-rabbled furnace was introduced at the works of Matthiessen & Hegeler, LaSalle, Ill., with entirely successful results, but owing to the high cost of construction and the comparatively high cost of maintenance and operation, it has never been introduced except at works designed to make sulphuric acid from the sulphurous acid-gases. At present the Hegeler furnace is used at the following works: Matthiessen & Hegeler Zinc Co., LaSalle, Ill.; Illinois Zinc Co., Peru, Ill.; United Zinc & Chemical Co., Iola, Kas.; and Grasselli Chemical Co., Cleveland, Ohio.

With the exception of a small plant of the works of the Mineral Point Zinc Co. using the contact-process for making sulphuric acid, the four companies above named are the only manufacturers of acid from blende in the United States, the chamber-process being in general use. The difficulty of finding a market for sulphuric acid in the West has no doubt pre-

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vented its more extended manufacture. The acid market, however, is gradually widening, and no doubt the manufacture of sulphuric acid from blende will become more common.

A new departure in this line of work has lately been made by the Grasselli Chemical Co., which manufactures sulphuric acid from Joplin blende at Cleveland, Ohio, and ships the roasted ore to West Virginia to be smelted with natural gas

Mechanical Roasting Furnaces.—The roasting of zinc blende in mechanically-stirred reverberatory furnaces marked the first advance in the reverberatory furnace practice. The first successful furnace of this type was the Brown horse-shoe furnace, invented in 1892, and its working gave an entirely new idea to inventors. Furnaces embodying the Brown invention sprang up like mushrooms all over the United States. Among the first to enter the field being the Pearce and the Ropp types, but litigation soon stopped their general introduction.

Compared with the ordinary hand-rabbled furnace, mechanical furnaces effect a considerable saving in labor and yield a better and more uniform desulphurization of the ore roasted.

Mechanically-stirred furnaces of the Brown type are in use at the works of the Edgar Zinc Co., at Carondelet, Mo., and Cherryvale, Kas., and at the plant of the Collinsville Zinc Co. at Collinsville, Ill.

Recently, a number of mechanically-stirred furnaces of the Ropp type were in use at the plant of the Lanyon Zinc Co., at Iola, Kas., but these had to be changed to the Cappeau type, in order to avoid an infringement of the Brown patents, the Ropp furnaces having been declared an infringement of Brown's patents.

Smelting Zinc-Ore.

There has been no radical change in the method of smelting zinc-ore. The old style of distillation is still in use, all attempts at direct smelting having resulted in absolute failure.

The Belgian type of furnace is universally used throughout the middle West, either direct-fired or gas-fired, the latter with or without heat-recuperation.

Hegeler "Blow"-Furnace.—The first attempt at gas-firing was made by Matthiessen & Hegeler and resulted in the development of the Hegeler "blow"-furnace. Mr. Hegeler found that by firing with gas, the length of the furnace could be

greatly increased, all that was necessary being to introduce the quantity of gas required to heat the whole furnace and burn it gradually by introducing air at intervals. The Hegeler furnace, as now built, consists of a long rectangular chamber having retorts placed four rows high, and in some cases six; the gases from the producers enter at one end and are discharged at the other. Air for combustion is introduced through iron pipes entering the front of the furnace at various places alongside of the retorts. Both air and gas enter under pressure produced by a positive blast. The producers are operated with a hot top and are placed close to the furnace. No recuperation or regeneration is attempted in the furnace, but the hot gases escaping are used for the generation of steam for power-purposes. These furnaces have been built in size varying from 224 to 504 retorts to the furnace, or from 448 to 1,008 retorts to the block.

Siemens Furnace.—The next attempt at gas-firing was made by the Illinois Zinc Co., at Peru, Ill. This company adopted the Siemens regenerative furnace, built on the well-known principle of the Siemens regenerative system. The Siemens producers, however, proved inefficient and were later replaced by steam-blast producers. The furnaces were originally built with large elliptical retorts, arranged in 3 rows, but lately they have been replaced with circular retorts placed 4 rows high. The latest improvement on these furnaces has been the Neureuther patent, which consists in extending the air- and gas-channels partly up into the center wall, by which both air and gas are admitted into the furnace-chamber at a higher point than was usual. By this means it is claimed that the furnace can be built 5 rows high without detracting from its efficiency. It is also claimed that the furnace is heated more evenly on account of the shorter reach of the flame.

In 1882 the Rich Hill Zinc Works at Rich Hill, Mo., and the Granby Mining & Smelting Co., at Pittsburg, Kas., each built furnaces of the Siemens regeneration principle, which were failures, and were abandoned later. The Rich Hill furnace was built exactly like those of the Illinois Zinc Co., having large elliptical retorts, in three tiers, while the Granby furnace was built with small circular retorts arranged in four tiers.

The failure of the Rich Hill furnace was partly due to mis-

EPA7-002033

management and partly to faulty construction. From my own observation the elliptical retorts were entirely too large for the heavy Joplin ore, and the furnace could not be worked "dry" in the required time; consequently the percentage of yield was poor. The Siemens producers required the use of a better grade of fuel which, at that time, was at least five times as expensive as the slack coal burned in the direct-fired furnaces. The most serious mistake, however, was in the arrangement of the gas- and air-channels underneath the checker-work. These channels, not being accessible during the time the furnace was in operation, soon became clogged with zinc oxide which had escaped from leaky retorts. So serious was the interference that an irregularity in the working of the furnace could be detected a few months after the furnace had been put in operation. This clogging caused frequent shut-downs, and instead of having produced a furnace with long campaigns and small repairs, it gave short campaigns and frequent and extensive repairs. In the Granby furnace the circular retorts were better adapted to the work, but the same defects of construction existed as in the Rich Hill furnace and the results were the same.

The high cost of construction of the regenerative furnace and the inability to use the common slack-coal of the district, together with the poor work accomplished on account of faulty construction, soon brought the improved furnace into bad repute; and so prejudicial was the result that no more gas-furnaces were constructed, everybody reverting to the old style of direct-fired furnaces.

Direct-Fired Furnace.—If it had not been for the local cheap slack-coal, other attempts at gas-firing would no doubt have been made, but slack-coal could not be burned to advantage in independent producers, on account of its inferior quality; hence the direct-fired furnace came into general favor. These furnaces were cheap to construct and gave, as a rule, good average results, although the consumption of coal was large and the labor was excessive.

The first direct-fired furnaces built in Kansas had square fronts, and contained 7 rows of 14 retorts each, which amounted to 98 retorts to the furnace, or 196 retorts to the block. Later, the size of the furnace was increased to 16 retorts in a row, set

7 high, corresponding to 112 to the furnace, or 224 to the block, which remained the accepted type until the building of coal-furnaces ceased on account of the extensive discovery of natural gas in Kansas. In 1892 the natural-gas district of Indiana attracted attention, and a plant was built at Marion, followed by one at Ingalls and one at Upland.

Natural-Gas Furnace.—The application of natural gas to the zinc-distillation furnace, however, was not as simple as was at first supposed, and the first attempts for this purpose caused a great deal of worry and anxiety to the operators. The natural-draft furnaces of Indiana, in which a mixture of air and gas, on the principle of the Bunsen burner, was introduced through openings in the front or back of the furnace direct into the furnace-chamber, worked very irregularly. With the narrow channels of the zinc furnace, it seemed impossible to distribute and control the heat properly, and frequent "butchers" or break-downs of the retorts occurred with a correspondingly heavy loss of metal. Consequently, when the industry was started in the natural-gas district of Kansas in 1897, the first thing that suggested itself was to improve the distillation furnace and the method of using the gas. Natural draft was discarded in favor of positive blast. In fact, the Hegeler blow-furnace was copied as near as conditions permitted. In the original form of the natural-gas-fired distilling-furnace, the gas was introduced at one end, in the same manner as in the producer-gas-fired furnace, and the heat regulated by the introduction of air at various places. This arrangement, however, was not satisfactory, for the reason that natural gas, having a high calorific value, was not completely burned in the furnace by the air introduced for this purpose, and, as a result of the incomplete combustion, large quantities of carbon were deposited in the spaces between the retorts which clogged the furnace. In order to insure the complete combustion of the natural gas, and thereby overcome the deposition of carbon, more air was forced in, which, however, caused the furnace to become overheated. A careful study of the requirements indicated a change in the method of introducing the gas and air, so that they would enter jointly at various places through the front. A furnace was then designed which proved satisfactory, but the regulation of the heat of this form of furnace remained a difficult task, and, un-

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less watched very closely, irregularities and frequent breakdowns occur.

The peculiar heat-requirements of a zinc-furnace differ from most other metallurgical furnaces insofar that there is no large space in which to make use of radiant heat. On account of the narrow channels between the numerous rows of retorts the heat must be supplied almost entirely by conduction, which makes it necessary to surround the retorts continually with a flame having the required temperature. As the retorts are easily destroyed by over-heating, an excess of heat must be carefully avoided. The strong cutting-action of a blow-pipe flame, such as is produced in the blow-furnace, easily causes overheating and a consequent destruction of the retorts. It also tends to an early destruction of the lining of the furnace, causing frequent and expensive repairs.

The blow-furnace was first built in sizes of 5 rows of 60 retorts (300 retorts) to the side. Later, the combustion-chamber built at one end was discarded and the space was utilized by adding 20 additional retorts, so that now the accepted size is 5 rows of 64 retorts (320) to the furnace, or 640 to the block. Lately, the tendency has been to limit the number of rows to four, with a corresponding increase in length of the furnace in order to hold the same number of retorts, an arrangement which makes the furnace long, and in some works they have been divided into two transverse sections, placed in tandem in the same building. By working both sections as one furnace, the same economy of labor is retained. While the labor-requirements on these large furnaces is considerably less than on the small direct-fired furnaces, it is also more trying. The men being more exposed to the heat, which causes considerable trouble at times during the hot summer months. In order to avoid the trouble, the Edgar Zinc Co., at Cherryvale, limited each furnace to 5 rows of 20 retorts (100 retorts), or 200 to the block. By placing three blocks in one building, each separated from the other by a 12-ft. space, and operating the three small furnaces as one large one, the same economy of labor is obtained without having the men exposed to the heat as much as they would be with the single large furnaces.

These furnaces are also constructed to operate with natural draft and have proven quite successful. By admitting air and

gas some distance below the lower row of retorts, primary combustion takes place before the gases reach the furnace-chamber proper; and by admitting more air, a secondary combustion takes place in the furnace-chamber, causing a very uniform heat without the deposition of carbon. Thus the cutting-action of the blow-pipe flame is entirely avoided, and repairs have been reduced to a minimum, which allows a long campaign of operation.

Lately, the coal-fired smelting-plant at Girard was removed to Chanute, Kas., to be operated with natural gas. The furnaces are arranged similar to those at Cherryvale, but each furnace has only 80 retorts, or 160 to the block, and the four blocks are placed in one building with each side operated as one furnace. These furnaces are also run by natural draft, similar to those at Cherryvale. Recently, a furnace was constructed at the works of the Prime Western Zinc Co., at Gas City, Kas., using the recuperative principle of the Converse and De Saulles furnace. This furnace is a patented one which was developed at the plant of the New Jersey Zinc Co., at Palmerton, Pa.

The Table I., which may not be strictly accurate, shows the changes that have taken place and the present condition of the zinc-industry.

Smelting in Colorado.—During the past few years the utilization of zinc-blende found associated with silver- and gold-ore in Colorado gave rise to the zinc-smelting industry at Pueblo, Colo. The United States Zinc Co., a branch of the American Smelting & Refining Co., built a plant at Pueblo, during 1903, which is said to be in successful operation now, although numerous obstacles were encountered at first, as is usually the case when opening up a new field.

Retorts for Zinc Distillation.—Circular retorts, used exclusively in the West, vary but little in dimensions at the different works. They are usually about 10.5 in. in external and 8 in. in internal diameter and from 48 to 54 in. long. Formerly they were made by hand, but now they are almost exclusively made by machine, either the ordinary auger-machine or a hydraulic press. The latter type of machine is coming more into use and no doubt is the better of the two; it makes a very dense retort, which prevents leakage of zinc-vapor through its walls. A pressure

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TABLE I.—*Data Relating to the Growth of the Zinc-Industry in the Middle West.*

Year of Construction.	Name of Company	Abandoned. No. of Retorts.	Abandoned. Total.	In Operation. No. of Retorts.	In Operation. Total.
	COAL-BURNING SMELTERS—ILLINOIS.				
1863	Matthiessen & Hegeler Zinc Co., LaSalle				
1869	Illinois Zinc Co., Peru				
1875	Lamaghi Zinc Works, Collinsville	210			
1886	Collinsville Zinc Co., Collinsville				
1892	Waukegan Zinc Works, Waukegan				
1891	Winona Zinc Works, Winona				
1897	Sandoval Zinc Works, Sandoval		210		
	MISSOURI.				
1869	Missouri Zinc Works, Carondelet	1,020			
1872	Martindale Zinc Works				
	Edgar Zinc Co. Carondelet.				
1873	Carondelet Zinc Works				
1881	Joplin Zinc Works, Joplin	1,020			
1882	Rich Hill Zinc Works, Rich Hill				
1887	Robert Lanyon, Nevada	1,344			
1896	Geo. E. Nicholson, Nevada		3,384		3,384
	KANSAS.				
1874	Weir City Zinc Works, Weir City	1,200			
1878	Robert Lanyon, Pittsburg	1,200			
1881	S. H. Lanyon & Bro., Pittsburg	480			
1882	W. & J. Lanyon, Pittsburg	840			
1882	Granby Mining & Smelting Co., Pittsburg	912			
1888	Scammonville Zinc Works, Scammonville	100			
1886	Girard Zinc Works (old), Girard	148			
1889	Girard Zinc Works (new), Girard	936			
1891	Pittsburg & St. Louis, Pittsburg			864	
1890	Weir City North Works, Pittsburg			1,241	
1895	Chicopee Zinc Co., Cherokee	148			
1894	Midland Smelting Co., Bruce	1,150	8,060		2,240
	Totals		11,702		15,606
	NATURAL-GAS BURNING SMELTERS—INDIANA.				
1892	Columbia Zinc Works, Marion	891			
1893	Ingalls Zinc Works, Ingalls	741			
1893	Upland Zinc Works, Upland	600	2,232		
	KANSAS.				
1897	Lanyon Zinc Co. { Robert Lanyon Sons Spelter Co., Iola.				
1898	Lanyon Zinc Co. { Robert Lanyon Sons Spelter Co., La Harpe.			9,600	
1897	Lanyon Zinc Co. { W. & J. Lanyon, Iola.				
1898	Prime Western Zinc Co. { Prime Western Z. Co., Gas City.				
1902	Prime Western Zinc Co. { Nicholson Z. Wks., Iola.			8,200	
1902	Prime Western Zinc Co. { A. B. Cockerill, Gas City				
1899	Cherokee-Lanyon Zinc Co., Gas City			2,400	
1898	Edgar Zinc Co., Cherryvale			1,800	
1901	United Zinc & Chemical, Iola			2,400	
1902	Granby Mining & S. Co., Neodesha			2,400	
1903	La Harpe Zinc Co., La Harpe			2,100	
1902	Chanute Zinc Co., Chanute			1,260	
1904	A. B. Cockerill, Altoona			1,800	
1904	Wm. Lanyon, Caney			1,800	37,460
	Total in gas-district		2,232		38,060
	Total in coal-district		11,702		15,606
	Grand total		13,936		53,666

of about 1,000 lb. per sq. in. is used. The capacity of both machines is about equal, but the cost of the hydraulic press plant is ten times that of the auger-machine.

Following the introduction of large furnaces, the method of operating has changed and numerous improvements have been made. Residues are now blown out from the retorts by a stream of water, instead of being scraped out with iron scrapers, as was formerly the practice.

Charging the Ore.—The ore-mixture is prepared outside of the furnace-building, instead of in front of the furnaces as formerly, and the charging is done in tiers instead of rows. The ore and coal are mixed mechanically and the mixture is placed in hopper-shaped charging-cars, from which it is charged into the furnaces. This mixture is usually prepared a day in advance, in order that it shall be ready for use when charging begins.

Drawing the Metal.—The metal is now drawn in large ladles holding from 300 to 400 lb., instead of the former smaller ones holding from 40 to 50 lb. These large ladles are suspended from cranes attached to trucks running on rails in front of the furnace and supplied with protecting-shields. In some cases the ladle is hung to a shield suspended from a single overhead-rail fastened to the furnace-front and traveling the whole length of the furnace.

At present the three sheet-zinc mills in the United States are in the western district. Matthiessen & Hegeler first rolled sheet-zinc in the West, followed by the Illinois Zinc Co.; both having sufficient capacity to roll their entire product of spelter into sheet. In 1902 the Lanyon Zinc Co. built a small mill at La Harpe, Kas., which has since been in constant operation.

MANUFACTURE OF ZINC OXIDE.

While the manufacture of zinc oxide is confined principally to the eastern district, a few establishments are in the West. Generally the requirements for making zinc oxide cannot well be met in the West. In the first place anthracite coal, which is scarce in the West, is necessary, and cannot be had except at prohibitory prices. Oxidized zinc-ores free from cadmium are also necessary. Ores of this character occur in Wisconsin and the large plant of the Mineral Point Zinc Co., a branch of the New Jersey Zinc Co., has been erected at Mineral Point to

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treat these ores. A small plant, started in 1902 at West Plains, Mo., was soon absorbed by the New Jersey Zinc Co., and I believe is now out of commission. A third plant, the Ozark Zinc Oxide Co., built some years ago at Joplin, has so far remained independent, but difficulty was experienced at times in getting proper ore-supplies. At present these are obtained from New Mexico.

The zinc oxide industry will, in all likelihood, be controlled for some time to come by the New Jersey Zinc Co., which has practically an unlimited supply of ore admirably adapted to this purpose and abundant anthracite coal near its plants.

NOTE BY THE SECRETARY.—Comments or criticisms upon all papers, whether private corrections of typographical or other errors or communications for publication as "Discussions," or independent papers on the same or a related subject, are earnestly invited.

SUBJECT TO REVISION.

[TRANSACTIONS OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.]

The Fire-Clays of Missouri.

BY H. A. WHEELER, ST. LOUIS, MO.

(Lake Superior Meeting, September, 1904.*)

THE CLAY INDUSTRY OF THE UNITED STATES.

IT may surprise some of our members to learn, among the industries based on the mineral resources of the United States, that of clay now ranks third, being exceeded in value of product only by pig-iron and coal. The present annual value of clay-products exceeds the value of the outputs of gold and silver, and also exceeds the combined values of copper, lead, zinc, aluminum, mercury, antimony and nickel. These facts are shown in Table I. which gives the statistics for the year 1902:

TABLE I.—*Production of Metals, Coal and Clay in the United States During* 1902.†

	Value
Pig-iron,	$372,775,000
Coal (including anthracite), $76,173,586,	367,032,069
Clay products,	122,169,531
Gold,	80,000,000
Copper,	76,568,954
Petroleum,	71,178,910
Silver (coin-value),	71,757,575
Lead,	22,140,000
Zinc,	14,625,596
Aluminum,	2,284,500
Mercury,	1,467,848
Antimony,	634,506
Nickel,	2,701

NOTE.—The value of the clay-products in the United States in 1903 was $130,962,648.

Of the total amount, $122,169,531 assigned for the value of the clay-products of the United States during 1902, about 20

* Presented at the Supplementary Session of the Institute in St. Louis.

† *Mineral Resources of the United States for* 1902, United States Geological Survey, Washington.

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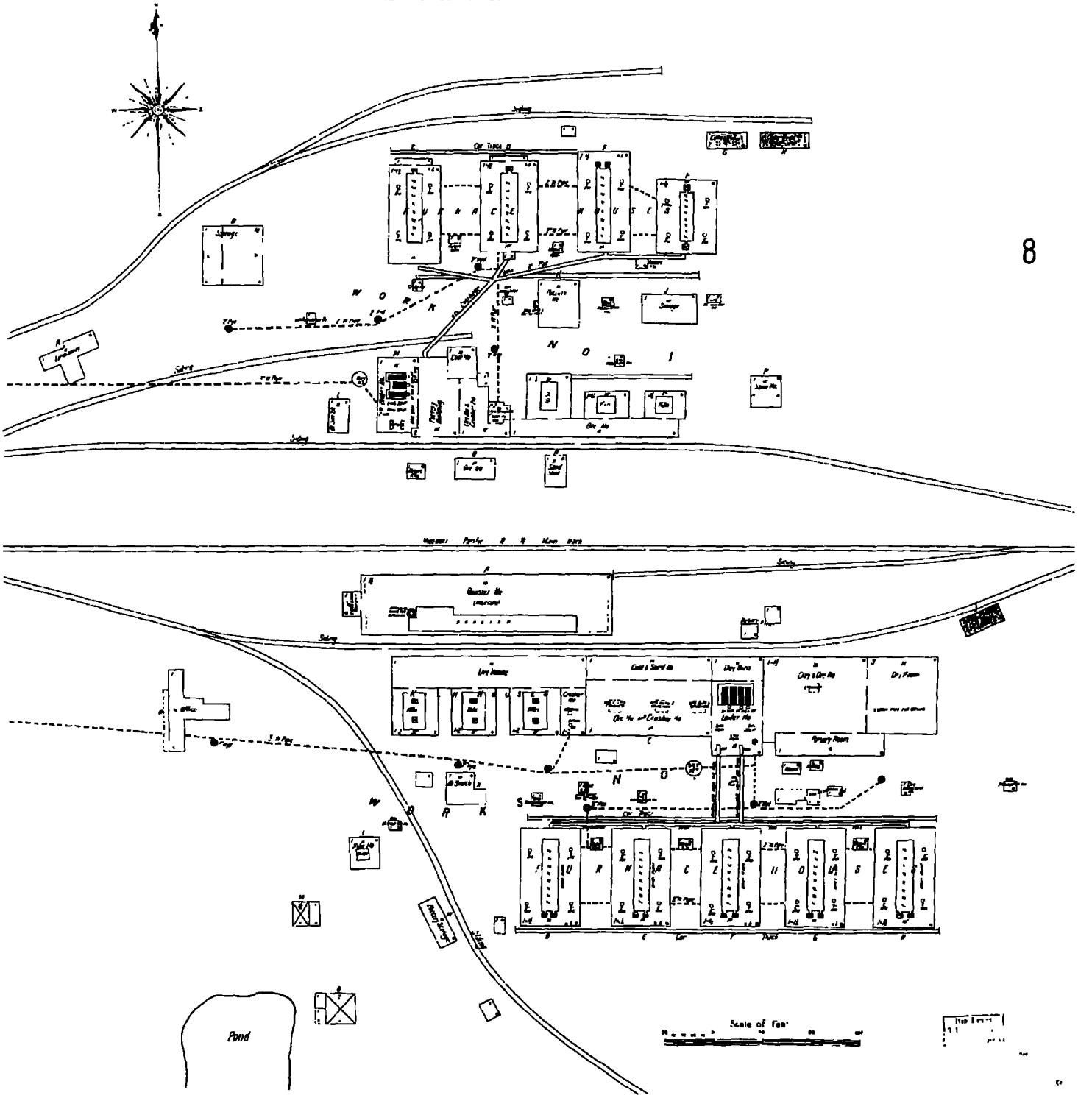
PRIME WESTERN SPELTER CO. SMELTER WORKS. NO. 1 AND 2.



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60TH CONGRESS, 2d Session } HOUSE OF REPRESENTATIVES { DOCUMENT No. 1505

U.S. Congress. House. Committee on Ways and Means.

TARIFF HEARINGS

BEFORE THE COMMITTEE ON WAYS AND MEANS OF THE HOUSE OF REPRESENTATIVES

SIXTIETH CONGRESS

1908-1909

BUREAU OF FOREIGN AND DOMESTIC COMMERCE
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VOL. III

SCHEDULE C (continued)—Metals, and Manufactures of
SCHEDULE D—Wood, and Manufactures of
SCHEDULE E—Sugar, Molasses, and Manufactures of

WASHINGTON
GOVERNMENT PRINTING OFFICE
1909

EPA7-002039

THE NEW JERSEY ZINC COMPANY, NEW YORK CITY, THINKS IT UNWISE TO PLACE A DUTY ON ZINC ORE.

NEW YORK CITY, *December 16, 1908.*

Hon. SERENO E. PAYNE,
Chairman Committee on Ways and Means,
House of Representatives.

DEAR SIR: You suggested to our representative at the tariff hearing on November 10 that some of the owners of zinc mines in the Joplin (Mo.) district had been agitating the question of a protective duty on zinc ores, and you stated that it might be well for us to study their reasons and hear what they had to say. This matter is one which is of the greatest importance and has claimed our closest attention.

We are now and always have been of the opinion that it would be most unwise to place an import duty on zinc ores.

Our company is largely interested in zinc-ore properties in various parts of the United States. These properties are in New Jersey, Missouri, Colorado, Wisconsin, New Mexico, Pennsylvania, and Virginia. Out of all the zinc ore produced in this country in each of the past four years ending December 31, 1907, these properties produced in 1904, 41.9 per cent; in 1905, 46.2 per cent; in 1906, 46.4 per cent; in 1907, 43.8 per cent. We and our predecessors have been continuously in the business for about sixty years. During that entire period, except for the tariffs of 1846 and 1857, we have been without protection for our ores. We have not felt the need of protection for our ores at any time, and do not feel the need of it now. On the contrary, an import duty on zinc ore will greatly hasten the exhaustion of some of the natural resources of this country which can never be reproduced, will seriously cramp the business of the domestic zinc-manufacturing industry, and will aid the European ore buyers and manufacturers without yielding a corresponding benefit to domestic zinc miners. This country does not produce enough zinc ore for normal requirements.

We should be glad to furnish your committee with such information as you may desire if you will be good enough to let us know just what you require.

Very respectfully,

THE NEW JERSEY ZINC COMPANY,
S. S. PALMER, *President.*

THE NEW JERSEY ZINC COMPANY, NEW YORK CITY, SUBMITS ADDITIONAL BRIEF IN FAVOR OF FREE ZINC ORE.

71 BROADWAY,
NEW YORK CITY, *January 1, 1909.*

COMMITTEE ON WAYS AND MEANS,
Washington, D. C.

GENTLEMEN: The New Jersey Zinc Company is a corporation of the State of New Jersey. It owns zinc mines in Sussex County, N. J., and a zinc-manufacturing plant at Newark, N. J. The present com-

pany was incorporated in 1880. It and its predecessors have been continuously in the business of mining zinc ores in New Jersey for about sixty years. Among the domestic producers of zinc ore the New Jersey Zinc Company is the largest. It produces all the zinc ore mined in New Jersey, and the production of New Jersey, as compared with other States of the Union in the years 1904 to 1907, appears from the following table, taken from Mineral Industry for 1907 (Vol. XVI), at page 904:

State.	1904.	1905.	1906.	1907.
	Tons.	Tons.	Tons.	Tons.
Arkansas	[a] 1,000	2,200	4,280	4,088
Colorado	[b] 94,000	105,500	114,000	142,510
Idaho	Nil.	1,700	2,150	11,847
Kentucky	[c] 958	[c] 414	975	1,005
Missouri-Kansas	[d] 273,238	[d] 258,500	[d] 280,260	297,126
Montana	Nil.	2,000	4,900	1,218
Nevada	Nil.	Nil.	7,080	4,593
New Mexico	[e] 21,000	17,800	20,000	4,281
New Jersey	[c] 280,029	[c] 361,829	404,690	368,710
Oklahoma				3,240
Utah	Nil.	9,265	10,700	9,043
Wisconsin	[a] 19,300	32,660	42,130	53,011
Others	[b] 2,600	[f] 3,800	[g] 850	[g] 2,241
Total	693,025	795,698	906,175	902,923

[a] According to H. F. Bain, Contributions to Economic Geology, 1904.
[b] Estimated.
[c] Report of state geologists; crude ore.
[d] Production of Joplin district, plus output of southeastern Missouri, the latter as reported by the state mine inspector.
[e] Partly estimated.
[f] Arizona, Nevada, Iowa, Tennessee, and Virginia.
[g] Tennessee, Arizona, and California.

From the foregoing table it appears that the New Jersey Zinc Company has produced in New Jersey in each year more zinc ore than was produced in any other one State or district. This company is also largely interested in zinc-ore properties in Missouri, Colorado, Wisconsin, New Mexico, Pennsylvania, and Virginia. From these properties, including the output of the company's New Jersey mine, there was produced in each of the past four years ending December 31, 1904–1907, the following percentages of all the zinc ore mined in the United States: In 1904, 41.9 per cent; in 1905, 46.2 per cent; in 1906, 46.4 per cent; in 1907, 43.8 per cent. As domestic ore producers, we are, therefore, largely interested in the present concerted movement of some of the Joplin mine owners and a buyer of Mexican zinc ore for European smelters in their attempt, by means of a prohibitive tariff, to shut foreign zinc ore out of the United States.

EXPERIENCE HAS NOT SHOWN A NECESSITY FOR A PROTECTIVE TARIFF ON ZINC ORE.

The ores from the New Jersey mines are of a class known in trade as "calamine," i. e., the carbonates and silicates of zinc, and they have been continuously on the free list in all the tariff acts since 1792, except in the tariff acts of 1846 and 1857. Originally, and until comparatively recent years, the term calamine has included all the ores of zinc that were commercially valuable. It is only recently that the blende ores, i. e., the ores containing sulphide or zinc, have been considered commercially valuable. It has, therefore, been the

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apparent policy of the Government, from the earliest time, to admit zinc ores free of duty; and experience has shown that this policy of the Government is sound. To illustrate: Although the New Jersey Zinc Company's mines and works are near the Atlantic seaboard and therefore geographically exposed to the competition of zinc ores from Mexico by water routes and from Europe and Australia, the importation of foreign ores up to the present time has not been considerable or other than a benefit in helping out the domestic supply. It has never appeared to be in any way a menace to domestic enterprises and we can see no ground for alarm on this score in the future.

If calamine ores have been mined without a protective tariff for more than sixty years, it would certainly be supposed that the blende ores could equally get along without protection. It will be noted that copper ore and several others besides zinc are on the free list.

THE PRODUCTION OF ZINC ORE FROM THE JOPLIN DISTRICT DOES NOT KEEP PACE WITH THE DEMAND.

The rapid development of domestic manufactures in which zinc is used has made the question of ore supply important. The following table shows that the production of domestic spelter, i. e., metallic zinc, has increased much more rapidly than the production of zinc ore from the Joplin district in spite of the fact that the price of such ore has increased much more than the price of spelter. The figures are compiled from the Mineral Industry for 1907.

Year.	Zinc ore produced in Joplin district.	Average price of ore at Joplin.	Spelter produced in United States.	Average price of spelter at New York.
	Tons.		*Tons.*	
1900	248,446	$26.80	128,521	$4.29
1901	258,306	24.21	140,822	4.07
1902	262,545	30.73	158,229	4.84
1903	284,873	34.44	158,802	5.40
1904	267,240	37.40	181,808	5.10
1905	252,436	47.40	201,748	5.88
1906	278,930	44.82	225,494	6.19
1907	286,589	44.36	249,612	5.95

This table shows that while spelter production in the United States has increased 102.4 per cent in the past eight years with an increase in price of 35.8 per cent, Joplin ore has increased in production by only 15.4 per cent, although its price has increased 67.4 per cent.

In addition to the figures given above, which tell their own story, it has been notorious in the trade that from a period long before the imported ores of Mexico and British Columbia were a subject of much interest, the Joplin district was failing to meet the increasing demands upon its mines. We have not attempted to collect all the evidence on this subject, but we have collected a number of items from the Engineering and Mining Journal, an impartial and recognized authority, showing the conditions of the Joplin ore supply in the years 1904, 1905, and 1906. These items follow:

Extracts from Engineering and Mining Journal of various dates.

(January 7, 1904, p. 15. Zinc in 1903, by W. R. Ingalls.)

The decline in production in the Joplin district was due partly to the very wet weather in the spring which interfered with operations to some extent, but the chief cause is obviously the inability of the mines of the district to do any more than they have been doing. It appears that the productive capacity of the Joplin district has attained its maximum, even if it be not already on the wane.

(August 4, 1904, p. 205. Missouri Ore Market, Special Correspondent.)

Even then, with the new smelters in the field for the product of the Missouri mines, the output will barely meet the urgent demands of the capacity of all the works drawing a supply from this district.

(September 8, 1904, p. 414. Missouri Ore Market, Special Correspondent.)

As has been previously outlined in the Journal, the output is insufficient to meet the demand of the increased smelting capacity drawing a supply from this district and in consequence, ore price has been about $4 per ton higher than the metal market for two months.

(September 29, 1904, p. 534. Missouri Ore Market.)

The effort to supply the demand of approximately 6,000 tons per week, with an output of approximately 5,000 tons, has resulted in cleaning up all the reserve ore in the district and forced buyers to contract largely ahead of the output.

(October 6, 1904, p. 573. Missouri Ore Market, Special Correspondent.)

There are just two things there is no apparent question about in the ore situation—the scarcity of zinc ore and the need of zinc ore.

(November 24, 1904, p. 854. Missouri Ore Market, Special Correspondent.)

The capacity of the smelters drawing ore from the Joplin district is greater than the mines are outputting, a fact that was pointed out in this column last July.

(January 8, 1905, p. 14. Zinc, by W. R. Ingalls.)

The direct cause of this has been of course the insufficiency of the Joplin ore supply to meet the present demand for spelter for consumption.

(March 18, 1905, p. 534. Missouri Ore Market.)

It was noted in this column last year that it was apparently a physical impossibility for this district to supply all the zinc ore needed to manufacture all spelter demanded by American consumers. Consequently, as this district does not keep pace with the increasing output of spelter, it becomes necessary each year to procure a larger proportion from some other source.

(June 29, 1905, p. 1269. Missouri Ore Market.)

So far the imported ore is of a grade that does not compare with the poorest ore of this district, and it is handled only because the output of this district is insufficient to meet the requirements of the smelter capacity of the United States.

(January 6, 1906, p. 12. Zinc, by W. R. Ingalls.)

It appears to be recognized that this district is now affording as large an output of ore as can reasonably be expected from it, and further supplies must be looked for in other quarters.

(February 3, 1906, p. 234. The Joplin district. Editorial.)

It is to be feared that there will be a further falling off in the output of zinc ore this year, even if the price continues high, for the reason that the new openings of ore are not compensating for the exhaustion of the older mines.

ENOUGH ORE HAS NEVER BEEN PRODUCED IN THE UNITED STATES TO KEEP THE SMELTERS SUPPLIED WHEN RUNNING AT FULL TIME.

According to Volume XVI of Mineral Industry, page 899, the spelter retorts in the United States number 89,560. The average consumption of ore is 40 pounds per diem for each retort. The

capacity of the retorts in a year of 360 days is 644,760 tons of ore. Before used in the retort all blende ore has to be roasted and, in that process, loses a percentage of weight; so that to keep the smelters in operation it would require not less than 758,000 tons of blende per annum. The largest production of domestic ore was in 1906, when 905,175 tons were produced. Of this production, after deducting only such portion of our New Jersey ores as was not available for spelter and assuming that every pound of other ore went to the smelters, there remain but 553,960 tons available for the smelters. This shows a balance of 204,040 tons of spelter ore to be produced from some source outside of the United States if all the smelters are in operation. The following table gives the foregoing facts in condensed form:

Total spelter retorts in United States in 1907		89,560
Average charge roasted ore per retort	pounds per diem..	40
Capacity of spelter retorts per year, roasted ore	tons..	644,760
Equivalent to	tons blende..	758,000
Total spelter ores produced in United States in 1906 (which was the year of largest production)	tons..	553,960
Ore required as above	do....	758,000
Ore available as above	do....	553,960
Ore which must be secured outside United States	do....	204,040

THE JOPLIN DISTRICT IS SAFE FROM FOREIGN COMPETITION WITHOUT A PROTECTIVE TARIFF.

The inland location of the Joplin mines and the proximity of the smelters and the large consumers of spelter would seem to furnish Joplin with complete immunity from foreign competition.

The entire zinc industry, including the Joplin producers, felt the depression of 1907–8, but they are in error in ascribing it to the importation of Mexican zinc ore, if, as might have been inferred from the arguments of Mr. S. Duffield Mitchell and Mr. A. O. Ihlseng, they do so ascribe it. It is our belief that had business remained normal during 1907 the Joplin ore producers would not have noticed the importations of zinc ore. That it is an afterthought on the part of some of the interested parties to place the cause of poor business in 1907 on Mexican ore is clear to anyone who will read the leading article in the Joplin Daily Globe of January 26, 1908. We quote from it the following:

> The panic has proved that the ores of Mexico can not be produced under a 5-cent spelter market, according to the highest authority, and correspondence from a leading reliable source conveys the information that the halcyon days of the Mexican production are of the past—a history and recollection only—that the immediate future has little hopes in store for an early resumption of outputting, while transportation matters have become a serious problem, except through a few months of the summer.
>
> The producing areas of the Rocky Mountain States practically ceased their production early in the panic, Wisconsin, with Joplin, continuing a small output to the end of the year.
>
> In writing of the year's record of zinc-ore production, Walter Renton Ingalls, in the Engineering and Mining Journal, concludes his résumé in these words: "In any event, the experience of 1907 seems to show that these foreign ores are not serious competitors of the American, duty or no duty." Mr. Ingalls might have added that no importations of ores were made except to supply a demand in excess of the domestic production.

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While the recent panic has proved that Mexican ores can not be produced under a 5-cent spelter market, it might be added thereto that Mexican ores are no competition to superior grade of ores mined in the Joplin district at any price for spelter. These ores will be imported only when the domestic supply of zinc ore is less than the demand of the smelters.

Another lesson the panic has forced home to the producers of the Joplin district, and to the smelters reducing the ore of this district, is the fact that the market for Joplin zinc ores rules the price of spelter in normal conditions of business. This means that with conservative production the producers of the zinc ore of this district can maintain their own price for their commodity, without reference to any other producing area under the sun, so long as those demands are in harmony with the general business conditions of the country at large.

This article we believe reflects the more intelligent sentiment of the United States ore producers, including those in Joplin. We appreciate that if, as is generally understood, Mr. Ihlseng is largely interested in the buying of Mexican ore as the agent of European smelters, he and others similarly situated would derive a peculiar benefit from a duty which would cut out the United States as a competitive buyer of Mexican ore, but we do not feel that an agent for foreign ore buyers should receive especial consideration from Congress. This feature we will take up later.

IMPORTED ORE HAS NOT DIMINISHED THE OUTPUT OF THE JOPLIN DISTRICT.

Imports of zinc ore into the United States.

[In tons of 2,000 pounds.]

Source.	1904.	1905.	1906.	1907.
British Columbia	2,100	8,561	600	1,157
Mexico	(?)	a 32,164	a 88,900	a 108,800
Total	(?)	40,725	89,500	109,957

a The actual tonnage of ore imported was somewhat greater than this figure, but it included some mixed ore, which for statistical purposes has been reduced to the zinc equivalent. This table is based on reports from the smelters of the ore received by them from these countries.—(From Mineral Industry, Vol. XVI, p. 904.)

From this last table it appears that the imports of 1907 exceeded those of 1906 by about 20,000 tons. Nevertheless, as appears by the first table, the Joplin district increased its production in 1907 over 1906 by 17,000 tons, while other districts seem to hold their own also. It would therefore seem clear that imported ore had not interfered with the domestic ore producers.

Joplin has, moreover, within itself an organization which affords a protection greater than would be secured by a prohibitive import duty.

The following extracts from the Engineering and Mining Journal show the methods of a very efficient inter-company organization, known as the "Missouri-Kansas Zinc Commissioners' Association," which, by timely exporting of ore, shutting down the mines, and otherwise controlling the supply of ore and fixing its prices, can protect the mine owners in times of ordinary business and hold up the ore buyers to such figures as suit the association.

Extracts from Engineering and Mining Journal of various dates.

(January 7, 1904, p. 15. Zinc in 1903, by W. R. Ingalls.)

In the Joplin market there was a small stock of ore on hand at the beginning of the year, and in order to bolster up the price an exportation of 1,000 tons was made in January, which, as it turned out, was a mistake. * * * In order to support the market the miners determined on the policy of operating their mills on part time or closing down entirely so as to restrict the output.

(January 14, 1904, p. 80. Progress of the Zinc Industry in Missouri during 1903, by Frank Nicholson.)

The Missouri-Kansas Zinc Miners' Association, acting in comparative harmony, caused a shut down of fully 70 per cent of all the mills in the district for a period of three weeks.

(January 21, 1904, p. 111. Letter and editorial signed "Zinc Miner.")

This centralization of control of the output makes it possible for a sufficient tonnage to be represented in any movement to regulate the surplus of ore.

(June 2, 1904, p. 907. Missouri Ore Market. Special correspondent.)

* * * as it is already evident that the ore producers are thinking strongly of restricting the output of zinc ore early this summer instead of waiting until fall, as has been the custom in past years.

(June 9, 1904, p. 947. Missouri Ore Market. Special correspondent.)

The owners of the larger mills have maintained a thorough organization of the Missouri and Kansas Zinc Miners' Association and another week of reductions in prices will see more restricting output.

(December 8, 1904, p. 934. Missouri Ore Market. Special correspondent.)

* * * But for the strong organization of the large producers, prices would not remain so high. This organization controls enough of the output to hold the balance of power in determining the market price.

(March 20, 1905, p. 530. Missouri Ore Market.)

It is evident from what may be learned that a secret organization of producers is preparing for a restriction of the output.

(April 8, 1905, p. 678. Missouri Ore Market.)

The producers will gradually restrict the output by closing down a few mills each week.

(May 4, 1905, p. 870. Missouri Ore Market.)

Prices are higher than it was expected to send them when the limited restriction in output was inaugurated the first of April.

THE SMELTERS ARE NOT IN ACCORD WITH THE DEMANDS OF MR. IHLSENG AND MR. MITCHELL.

Mr. Ihlseng is in error in stating to the committee that the zinc smelters in general approved the plan to place a duty on zinc ore. As we understand, the sentiment of the smelters is, as intimated by Mr. Clark's questions put to Mr. Ihlseng, directly opposed to the position of Mr. Ihlseng and Mr. Mitchell. The smelters feel that if the available supply of ore is materially reduced and the price materially advanced they can make spelter only at a cost which will make it dearer than imported spelter. This would affect not only the smelters and the consumers, but eventually the domestic ore producers themselves, who would find themselves to have been the means of putting their own customers out of business.

It is clear that a duty which precludes our smelters from buying Mexican ores would directly result in depressing the price of the ores

in Mexico and expose them for sale at a figure far below what European smelters must now pay for them. If the European smelters can get Mexican ore at a less price, they will make spelter for less, and may thus be able to put European spelter on the American market, in spite of the present spelter tariff of 1¼ cents per pound, at a figure below that at which our smelters can produce it.

These are dangers which must not be lost sight of.

A PROTECTIVE TARIFF ON ORES IS ECONOMICALLY UNSOUND.

A protective tariff on ores is equivalent to a premium on the speedy exhaustion of certain natural resources, which, once used, can never be reproduced. This objection has been urged against a duty on lumber, which in time, will grow again; but it applies most strongly to ores, which do not grow.

EXPORTATION OF ZINC ORE.

A point has been made of the figures showing exportation of zinc ore from America. The exported ore consists wholly, we believe, of (1) ore sent from the Joplin district for the express purpose of creating a shortage in the domestic supply and thereby enhancing the price, and (2) willemite, a mineral produced from New Jersey ore by magnetic separation. Willemite is used only for one purpose, viz, the making of metal known in the trade as "high-grade" spelter. The demand for this metal is very limited, and all that the domestic market will stand is manufactured each year. The surplus willemite is marketed to the best advantage abroad, where it is manufactured into "high-grade" spelter for the foreign market. Outside the items above mentioned, we believe there is no exportation of zinc ore.

THE INTEREST OF THIS COMPANY.

The committee has been warned by one witness, who professes to be disinterested, that it should not place too much reliance on the testimony of interested witnesses. The representatives of the Joplin district make no concealment of their interest in asking for a duty on zinc ore. On the other hand, the smelters make no concealment of their interest in protesting against such duty, nor do we profess to be disinterested. Representing five zinc-smelting plants in the Middle West which have experienced a shortage in the domestic-ore supply and which have, at times, been forced to import ore, we sincerely hope that, in case of future emergency, we may not find it impossible to increase the supply of domestic ore by importing from other countries. It is, moreover, our desire to prolong as far as practicable the life of our domestic-ore properties, and we have thought it possible to mix foreign ores with our own and in some cases materially lengthen the life of our mines. If we should be successful along these lines, the benefit would be shared by the other owners of zinc-ore properties throughout the country.

We believe that out of the opposing arguments, in spite of the interest of the parties making them, the committee can reach a proper conclusion.

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THE MEXICAN ZINC DEPOSITS.

The zinc ore heretofore imported from Mexico has consisted largely of gleanings from dumps of tailings at the old lead mines, and from abandoned lead mines where the ores were found to run too high in zinc for the uses of the lead smelters. From both of such sources the zinc ore was, from a mining standpoint, cheaply obtained because the tailings were piled on the surface and had only to be shoveled into carts or the mine was already opened up and ready for operation. For obvious reasons these two sources of zinc-ore supply are but temporary and are now, as we are advised, rapidly approaching an end. The alleged new discoveries of zinc deposits in Mexico have been greatly exaggerated. We have gone to considerable expense in the past five years in sending experts to search for such deposits in Mexico, but the results have been very disappointing. The known zinc deposits of importance in Mexico are comparatively few and their working is sure to entail much greater expense than the working of the tailings, dumps, and the abandoned lead mines. In the majority of zinc-ore propositions in Mexico transportation has been, and for many years will be, a matter of serious moment.

We should think it a simple matter for the committee, through a disinterested expert who is acquainted with conditions in Mexico, to verify the above statements.

CONCLUSION.

It is our conclusion, as the largest zinc-ore producer in this country, that the zinc-ore producers not only do not need a protective tariff on their ore but that such a tariff would be unwise from every point of view.

Respectfully sumbitted.

THE NEW JERSEY ZINC COMPANY.
By S. S. PALMER, *President.*

HON. GUSTAV KÜSTERMANN, M. C., FILES LETTER OF M. F. FOX, MADISON, WIS., FAVORING DUTY ON ZINC ORES.

MADISON, WIS., *January 4, 1909.*

Hon. GUSTAV KÜSTERMANN, M. C.,
House of Representatives, Washington, D. C.

DEAR SIR: Doubtless you are aware of the intense agitation now before the Committee on Ways and Means for a protective tariff on raw zinc ores. This is a measure of vital importance to the zinc-mining industry, which is just getting a foothold in southwestern Wisconsin. If the industry could only receive protection sufficient to equal the difference in cost of production of zinc ore in this country as compared with Mexico, it is the belief of those who are familiar with the situation that Wisconsin would within three years be producing $5,000,000 to $6,000,000 worth of zinc per annum. Its present production amounts to about $2,000,000.

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Filename: 1909-06-07 Allen Co Commissioners Order.pdf

DOCUMENT INFO

TITLE DOCUMENT 16

GRANTOR:	Allen County Commissioners
GRANTEE:	Prime Western Spelter Company
INSTRUMENT:	Order
DATE:	06/07/1909
BOOK:	21
PAGE:	570
PARCELS:	1, 3

Kansas Natural Gas Company,
By J.C.McDowell, General Manager.

State of Kansas, County of Allen, ss

Be It Remembered, that on this 7 day of May A.D.1909, that before me the undersigned, a Justice of the Peace in and for county and state aforesaid, came Lydia Sniff and Myrtle Cation, nee Sniff, Nellie Chapman, nee Sniff and J.H.Chapman her husband, who is personally known to me to be the same persons who executed the within instrument of writing, and such persons duly acknowledged the execution of the same.

In Testimony Whereof, I have hereunto set my hand and affixed my seal the day and year last above written.

W.C.Alford, Justice of the Peace for said County.

State of Kansas, County of Allen, ss

Be IT Remembered, That on xxxx this 7" day of May A.D 1909, before me the undersigned a Justice of the Peace, Public, in and for county and state aforesaid, came E.E.Sniff and Ida Sniff his wife, who is personally known to me to be the same persons who executed the within instrument of writing and such persons duly acknowledged the execution of the same.

In Testimony Whereof, I have hereunto set my hand and affixed my seal the day and year above written.

W.C.Alford.
Justice of the Peace in and for said County.

State of California, County of Kings, ss

Be It Remembered, That on this 12th day of May A.D.1909, before me the undersigned a Notary Public, in and for the county and state aforesaid, came Fred Cation who is personally known to me to be the same person who executed the within instrument of writing and such person duly acknowledged the execution of the same.

In Testimony Whereof, I have hereunto set my hand and affixed my official seal, the day and year above written.

SEAL C.Russell, Notary Public.

My commission expires Dec.28,1910.

State of Colorado, County of Arapahoe, ss

Be It Remembered, That on this 31 day of May A.D.1909, before me the undersigned, a Notary Public, in and for the county and state aforesaid, came Alonzo M.Sniff, divorced, who is personally known to me to be the same person who executed the within instrument of writing, and such person duly acknowledged the execution of the same.

In Testimony Whereof, I have hereunto set my hand and affixed my seal the day and year above written.

SEAL Gideon L.Burton, Notary Public.

My commission expires Dec.17th 1910.

State of Colorado, County of Arapahoe, ss

Be It Remembered, That on this 5 day of June A.D.1909 before me the undersigned, a Notary Public, in and for the county and state aforesaid, came Grace Sniff and William Sniff, who is personally known to me to be the same persons who executed the within instrument of writing and such person duly acknowledged the execution of the same.

In Testimony Whereof, I have hereunto set my hand and affixed my seal, the day and year above written.

SEAL Gideon L.Burton, Notary Public.

My commission expires Dec.17th 1910.

State of Kansas, Montgomery County, ss

Be It Remembered, That on this 14th day of June, 1909, before me, the undersigned, a Notary Public within and for said county and state, came J.C.McDowell, General Manager of The Kansas Natural Gas Company, to me personally known to be the same person who executed the above and foregoing instrument and to me duly acknowledged the execution of the same in the manner and form therein set forth as the act and deed of such corporation.

Witness my hand and notarial seal, the day and year last above written.

William Inge. Notary Public.

SEAL

My commission expires June 8,1913.

Filed June 15,1909 at 8 A.M. R.L.Thompson, Register of Deeds.

Commissioners Order.

Before the Board of County Commissioners of Allen County, Kansas.

In the matter of a Petition of Prime Western Spelter Company, a Corporation, for the Exclusion of its Smelter Site from the Boundaries of the City of Gas.

ORDER.

And now on the 7th day of June 1909, at 1 o'clock P.M., appeared Prime Western Spelter Company, a corporation, by C.A.N.deSaulles, its assistant general manager, and Baxter D.McClain its attorney, before the Board of County Commissioners of Allen County, Kansas, sitting in the regular June session 1909 of said board, and then and there duly requested that the petition of said Prime Western Spelter Company praying for an order of said board excluding certain property belonging to said company from the incorporated limits of the City of Gas Allen County, KanSas, (as more particularly described in said petition) filed in the office of the County Clerk on the 10th day of April, 1909, and notices of the hearing of which having been duly given as required by law, and proof thereof duly filed in said County Clerks office, be now considered and acted upon by said board; and it further appearing that no remonstrations or objections had been made, either orally or in writing, and that there were no persons present before said board remonstrating or objecting to said petition, the board thereupon took the same consideration and adjourned further action upon the same until the 9th day of June 1909, at 1 o'clock P.M. All parties present being duly advised of such continuance and adjournment of the further consideration of said petition.

And now on the 9th day of June, 1909 at 10'clock, P.M., the said petitioner prese[illegible] D.McClain, its attorney, and there being no other persons remonstrating or objecting to

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the same, the board of county commissioners continued the further hearing of said petition until the 15th day of June, 1909 at 2:00 o'clock, P.M., for the reason that the chairman of said board was unable to be present. All parties being duly advised of such continuance and adjournment of said petition.

And now on the 15th day of June, 1909, at 2:00 o'clock, P.M., the aforesaid petition of the said Prime Western Spelter Company coming on for further and final consideration of said board of county commissioners and the said board being fully advised in the premises, and there being no remonstrations or objections to said petition, either orally or in writing, and each and all of the members of said board of county commissioners being duly satisfied; that the said petitioner, Prime Western Spelter Company, is the owner of the lands sought to be excluded as hereinafter described; that said lands are unplatted; that said petition presented is in due and legal form and that due and legal notice of the time and place of hearing of the same of the said petition has been given as required by law; that no private rights will be injured or endangered by the granting of the said petition and the excluding of the lands therein described from the said city of Gas; that the public will suffer no loss or inconvenience thereby; that the prayer of the said petitioner should and ought to be granted; therefore,

It is hereby ordered and directed by the board of county commissioners of Allen County, Kansas, that the prayer of the petition of the Prime Western Spelter Company, a corporation, filed in the office of the County Clerk of Allen County, Kansas, aforesaid, be and the same is hereby granted and that the lands of the said petitioner to wit:

(a) The South Half ($\frac{1}{2}$) of the South-west Quarter ($\frac{1}{4}$) of the North-east Quarter ($\frac{1}{4}$) of Section No. Thirty-two 032), Township No. Twenty-four(24) Range No. Nineteen(19) known as the Prime Western Spelter Company, Works No. 1; and

(b) A tract of land located in the North-half-($\frac{1}{2}$)-of-the-South-east-quarter-($\frac{1}{4}$)-of-said Section No. Thirty two(32) described as follows, Beginning at a point Eleven Hundred and Five (1105) feet west of the North east corner of the southeast quarter ($\frac{1}{4}$) of said section No. Thirty-two(32) Township No. Twenty-four(24) Range No. Nineteen(19) thence running west thirteen and one half ($13\frac{1}{2}$) chains, thence south ten and thirty eight one-hundredths(10.38) chains, thence east Thirteen and one-half ($13\frac{1}{2}$) chains, thence North Ten and thirty-eight one hundredths(10.38) chains to the point of beginning, known as Prime Western Spelter Company Works No. 2.

be, and the same are hereby excluded from the boundaries of the City of Gas, Allen County, Kansas, and that said lands so excluded be now listed and hereafter listed and scheduled as though it had never been a part of said city and that the boundaries of said city shall remain the same as they existed at and immediately prior to the making of this order of exclusion save and except in the following particulars, to wit:

That the western boundary line of said City of Gas running south along the center of said section No. Thirty-two(32) terminate where the same intersects with the north-west corner of the South half ($\frac{1}{2}$) of the South-west Quarter ($\frac{1}{4}$) of the North-east Quarter ($\frac{1}{4}$) Section Thirty-two(32), and thence run east along said north line of the said south half ($\frac{1}{2}$) to the north-east corner of said south half ($\frac{1}{2}$), thence south along the east line of said South half ($\frac{1}{2}$) to the south-east corner of said South half ($\frac{1}{2}$), thence east to a point Eleven Hundred and five(1105) feet west of the north-east corner of the south-east quarter ($\frac{1}{4}$) of said Section Thirty-two(32), thence south Ten and thirty-eight (10.38) hundredths chains, thence west thirteen and one-half ($13\frac{1}{2}$) chains, thence North Ten and thirty-eight hundredths (10.38) chains, thence west to the said central line of said section thirty two(32), and where the same now intersects with the heretofore west boundary of the city of Gas; and thence said boundary shall run south along said central line of said Section Thirty two(32) and continues and remain as the same existed prior to this order; provided however, that such change in boundary and the exclusion of the above described tracts shall in no way affect and this order is made subject to the right of way and property rights, as the same now exists, of the Fort Scott, Wichita & Western Railway Company (the Missouri Pacific Railway Company), as well as the jurisdiction and authority of the said, the City of Gas, over the same as such now exists; and further provided, that the said petitioner Prime Western Spelter Company consents and it is made a part of this order that the said the City of Gas, shall have permission to maintain a thorough fare, not exceeding thrity (30) feet in width, from the Southern extention of either main street, McRae Street or Taylor Street in said City, over and across the tract hereinbefore designated as Prime Western spelter Works No. 1, in a direct line from either of the aforesaid streets, which the said City may decide the most desirable to the station building located on the right-of-way of the Missouri Pacific Railway Company, but such privilege shall be at the expense of said City as to the maintonence thereof, and if the same be fenced, it shall be at the expense of said city and proper communicating gates shall be established on either side thereof and opposite each other at such point as the said Smelter Company, its successors or assigns, may designate.

It is further provided and made a part of this order that nothing herein shall be construed as in any way relieving the said, the Prime Western Spelter Company, a corporation, its successors or assigns, from its proportionate share and liability for future taxes on the premises herein exculded necessary for the payment of the water works bonds heretofore voted and issued by said City, together with the interest due, and becoming due thereon, or other bonds now existing and issued by said city, or other indebtedness of any kind for its proportionate payment of which the said company was, at the time of the granting of this order, liable but said company shall now and hereafter not be liable for the current taxes of said city, as levied from year to year, nor any other indebtedness of said city, as the same from time to time might accrue, or any claim or obligation of said city, or any proportionate part of the same, or either thereof, except as to the bond issue and kindred indebtedness above referred to, if any other there be; and the taxes annually levied by said City shall conform to the provisions hereof, and the County Clerk of Allen County, Kansas, is hereby ordered and directed in making up and preparing the tax rolls for the city of Gas, Allen County, Kansas, and particularly extending the same as to the properties in this order described, to extend and carry no levy of taxes against said tract of land for city purposes, except as provided in this order, but that said tracts of land for general paving purposes and the various levies that go to make up the same, shall be listed, valued, assessed and taxed in Elm Township, Allen County, Kansas, and the School District in which the same is located and the said Clerk shall extend the same upon the tax rolls of said Allen County, Kansas, in conformity with this order for the year 1909 and thereafter, provided that when the said bonded

and kindred indebtedness of said City of Gas is fully paid, said lands shall be entirely dropped from the tax rolls and assessments of said City.

And it is further ordered that this order be entered at length on the record of the proceedings of this board, and that the County Clerk certify copy of the same to the Register of Deeds of Allen County, Kansas, and likewise certify copy to the Mayor and Council of the said, The City of Gas, Allen County, Kansas.

In Witness Whereof, the said board of County Commissioners of Allen County, Kansas, have hereunto subscribed their names, this 15th day of June A.D. 1909.

(Signed) G.N.Reynolds.
(Seal) G.A.Meadows.
C.A.Frank.
County Commissioners.

Attest;
R.E.Culbertson, County Clerk.

State of Kansas,) Certificate.
County of Allen,) ss

I, the undersigned, County Clerk of Allen County, State of Kansas, do hereby certify upon my honor as such Clerk and under the seal of my office, that the aforegoing is a full, true and correct copy of the original order made and filed in my office in the above entitled matter, and as the same appears upon the records in my office.

In TEstimony Whereof, I have hereunto subscribed my name as such County Clerk and affixed hereunto the seal of said office this 16th day of June A.D. 1909.

R.E.Culbertson, County Clerk.

Filed June 16, 1909 at 2 P.M. R.L.Thompson, Register of Deeds.

Bill of Sale.

Know All Men By These Presents, that I have this day sold to Lutie Barrackman all the growing crops of every kind that I now have in Allen Co., Kansas, This bill of sale is given to secure the said Lutie Barrackman on a certain promissory note of 430 Dls. given Apr. 1st, 1909. June 16, 1909.

J.Barrackman.

Filed June, 18, 1909 at 3 P.M. R.L.Thompson, Register of Deeds.

Right of Way.

In consideration of one (1.00) Dollars, ($1.00) the receipt of which is hereby acknowledged, The Monarch Portland Cement Company, incorporated under the laws of the State of Kansas, of Humboldt, Kansas, do hereby grant unto the Humboldt Gas Company, incorporated under the laws of Kansas, Humboldt, Kansas, its successor and assigns, the right to lay, maintain operate and remove pipe to be used for the transportation of gas over its land in Allen County, State of Kansas, being south [illegible] quarter of Section (10, Township 26, Range 18, 35 acres more or less, as shown by "Exhibit A" attached hereto, which is a part of this contract. The lands described are what are known as the Cement Site; with ingress and egress to and from the same. The said Grantor to fully use and enjoy said premises except for the purposes hereby granted.

Said lines of pipe shall be laid upon a strip of land not to exceed eight feet in width through the property, Commencing at south line of "Greenfield" lands, thence north west to a point on the north line of the "gardner" land., being 1250 feet more or less, and shall at the request of the grantors be buried so as not to interfere with the cultivation of the soil or the laying of pipes by the grantee. The sum above named is in payment full for the right above granted and for the damage which will be done to crops, fences, and soil in laying, maintaining and operating the first of said lines which may be laid. Damages which may be done to crops and fences hereafter by laying, maintaining and operating any line, other that the first one laid or by removing any line shall be paid by the grantee, and and in case of disagreement as to the amount thereof, the same shall be determined by three disinterested persons, one of whom shall be chosen by the grantor, another by the grantee and a third by the two thus chosen.

Witness our hands and seals this 16th day of June A.D., 1909.

The Monarch Portland Cement Co.,
By O.W.Connet, President.
William Keith, Secretary.

The Humboldt Gas Co.,
By O.A.Evans, Prest.
W.P.Fussman, Secy.

State of Kansas, County of Allen,

Be It Remembered, That on this 16th day of June A.D. 1909, before me, a Notary Public, in and for said County, and State, came O.W.Connet, President of The Monarch Portland Cement Company and William Keith, Secretary of The Monarch Portland Cement Company, to me personally known to be the same persons described in, and who executed the foregoing instrument, and duly acknowledged the execution of the same.

In Witness Whereof, I have hereunto set my hand and affixed my official seal, the day and year last above written.

Hazel Gardner, Notary Public.

SEAL

My commission expires July 3, 1912.

(For Map of above described land see Next page.)

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THE COLLINSVILLE NEWS

VOL. 12 | COLLINSVILLE, OKLA., JAN. 12 1911. | NO. 35

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$ $ $ $ $

OVER FIVE MILLION
-: IN 1910 :-

We Sold Bank Drafts to the Amount of	$505,586.00
We Received Deposits to Amount of	$2,109,848.00
We Cashed Checks to the Amount of	$2,782,874.00
TOTAL	$5,398,308.00

We furnish these figures simply to give you an idea of the enormous amount of business handled over our counter during the year just past, and we are going to do even better this year. We are trying to give our customers the very best there is in banking. We have tried to make the words, "FARMERS & MERCHANTS BANK" synonymous with the words "Safety, Uprightness and Courtesy." We have tried to make our institution something more than a money-making machine and while we have hewed close to the line in regard to what we consider safe banking, we have tried so far as it was in our power, to help every one with whom we, as an institution, came in contact. If you are not already a depositor, open an account today, and enjoy the superior facilities offered to you through your association with the

FARMERS & MERCHANTS BANK
Your Deposits are Guaranteed.

$ $ $ $ $

COLLINSVILLE GET SMELTER

Tulsa World Reports one Landed Here.

Special to the World

Collinsvile, Okla., Jan. 11.—The thing which has been puzzling the people of Collinsville for some time past what means the action of the Santa Fe officials and the party of surveyors working just south of here was learned today when definite information was gained concerning the removal to this place of the Prime Western Smelting Company of Iola, Kansas

It is understood that definite consummation of the deal was made in Tulsa yesterday between Santa Fe men and C A DeSellem of the smelting company

From what can be learned, the Prime Western company will establish a five block zinc smelter just south of Collinsville, between here and Owasso The grounds are already laid off and surveyed, and it is presumed that the smelting company intends establishing a small town around the plant, which, it is understood, will cost in the neighborhood of $100,000

One of the chief reasons for the removal of The Prime Western company from Iola to this place is the question of gas here and the only cost will be in producing it The plant when fully completed, will use 250 men

It is understood that the smelting company has considered propositions made by Tulsans and Tulsa's Commercial organization but they could not overcome the treasure which the company holds in the way of gas

Collinsville is located on the Santa Fe about 18 miles north and east of Tulsa Local men have admitted the attempt to land the smelting company within the past several weeks It is safe to say, however, that much local benefit will be derived by reason of the locating of the concern so near to Tulsa

The location of the company at Collinsville, it is understood, did not involve the question of a bonus, the smelting company choosing that place only because of the ownership of surrounding gas lands

Bond and Howard is the name of a new law firm in Claremore of Judge Bonds will be remembered by all, as the first and very efficient and accommodating Judge of the county court of Rogers county.

News failed to report the incident of the home of Hal Hanson being burned on New Years eve and Mr Hanson was badly burn about the head It was very unfortunate, as they were literally cleaned out of house and home

Miss Brewton died at the home of R. Urquhan Wednesday night and was burried in the Adkins cemetery Thursday.

GUARANTEE ACT IS HELD GOOD

Oklahoma, Nebraska And Kansas Measures Are Constitutional

Washington, Jan 3.—The bank guaranty laws of Oklahoma, Nebraska and Kansas were declared constitutional today by the supreme court of the United States, and thus the fight over the policy of guaranteeing, through the state, of deposits in banks, was won by the advocates of such a policy

The opinions of the court were announced by Justice Holmes He said the main objection to the laws was that the assessment of banks by the state in order to create a fund to guarantee the deposits in other banks within the state took private property of one bank for the private use of another without compensation.

Justice Holmes admitted that there might be a taking of private property without return in any debts to a rival in business, but he said there were powerful considerations on the other side of the question.

"In the first place," he said, "it is established by many laws that an otherwise bad reason for advantageous may justify a comparatively insignificant taking of private property for what, in the immediate purpose, is a private use.

"It would seem that there may be other cases besides the one in which the share of each party in the benefit of a scheme of mutual protection is sufficient compensation for the co relative burden that it is compelled to assume At least if we have a case within the reasonable exercise of the police power as above explained, no more need be said"

The justice then proceeded to justify the laws under the police powers The police powers, he said may be put forth in aid of what is sanctioned by usage, or held by the prevailing morality or strong and preponderant opinion to be greatly and immediately necessary to the public welfare

The laws came within this limit, he held

The news that the supreme court of the United States had affirmed the Oklahoma supreme court in upholding the constitutionality of depositor's bank guaranty law was received with considerable internal horseplay today. Within fifteen minutes after M. L Turner, of the Western National Bank, had received a telegram announcing the decision, it was a subject of vast discussion in political and banking circles of the city

The case decided was that of the Noble State bank of Noble versus Governor C N Haskell, et al, the other defendants being the other members of the state banking board and the bank commissioner. It was a case originated in January, 1908, because the depositor's guaranty law was unpopular generally, and though he sued in the name of the Noble State Bank, was backed by contributions from many leading bankers of Oklahoma who were then unfriendly to the bank guaranty law The best legal talent was engaged on both sides and C B. Ames, of this city, was special counsel for the state in defending the guaranty law He made his final arguments at Washington only a few days ago

The fundamental principle involved in the case was the question Whether one bank could be compelled to contribute to a general fund to protect the deposits of all state banks generally The attorneys for the Noble state bank contended that in requiring this the law was an infringement of a leading principle of the United States constitution The case was filed before District Judge A H Huston, at Guthrie He was asked to grant a perpetual injunction restraining the state banking board and bank commissioners from collecting or levying an assessment for the guaranty fund, and from forfeiting the charter of the Noble bank for refusing to pay the assessment Judge Huston upheld the guaranty law and refused the injunction The case was appealed to the supreme court of the state and the guaranty law was again upheld Justice Robert L Williams, then chief justice, in a unanimously written decision in June 1908, sustained the law and ignored District Judge Huston in his refusal to grant the injunction The question of the guaranty law then appeal ed to the supreme court of the United States, where they have just again said finally.—New State Tribune

EPA7-002053

DOCUMENT INFO

EDFolder: D:\Question 09\Presentation Cited Docs\Prime Western\

Filename: 1912-10-22 US Patent 1041977 De Saulles NJZ.pdf

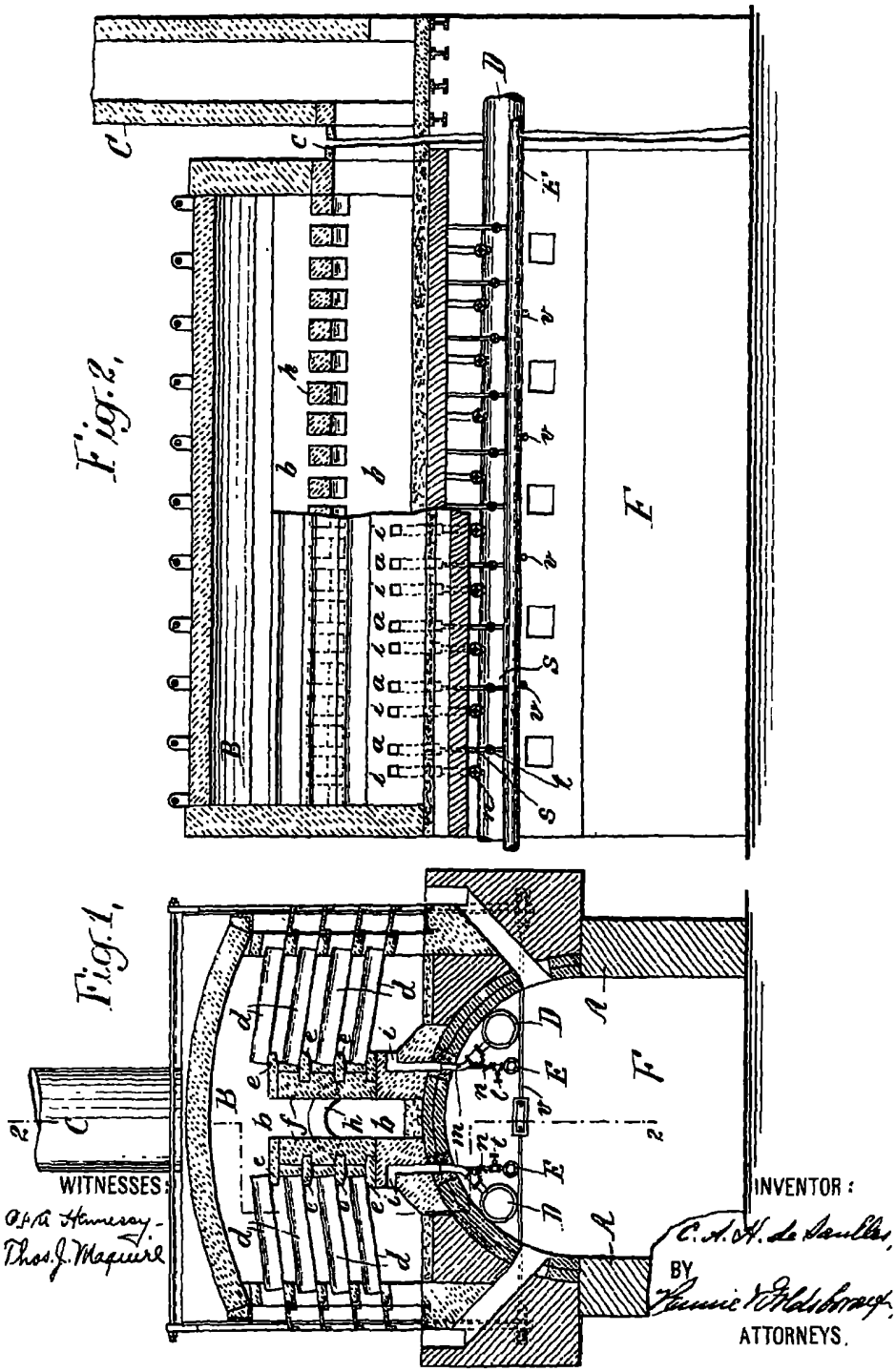
DOCUMENT INFO

C. A. H. DE SAULLES.

ZINC RETORT FURNACE.

APPLICATION FILED APR. 22, 1911.

1,041,977. Patented Oct. 22, 1912.



WITNESSES:

O. A. A. Hennessy.

Thos. J. Maguire

INVENTOR:

C. A. H. de Saulles,

BY

Fennie & Goldsborough,

ATTORNEYS.

UNITED STATES PATENT OFFICE.

CHARLES A. H. DE SAULLES, OF GAS, KANSAS, ASSIGNOR TO NEW JERSEY ZINC COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

ZINC RETORT-FURNACE.

1,041,977. Specification of Letters Patent. Patented Oct. 22, 1912.

Application filed April 22, 1911. Serial No. 622,671.

To all whom it may concern:

Be it known that I, CHARLES A. H. DE SAULLES, a citizen of the United States, residing in Gas, county of Allen, State of Kansas, have invented certain new and useful Improvements in Zinc Retort-Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to zinc retort furnaces of that type wherein the exit flue for the products of combustion is located at one end of the furnace chamber, the retorts or muffles being supported, as usual, in an inclined position, in a number of rows one above the other, and being heated from below by the combustion of gaseous fuel admitted through a series of gas ports associated with a corresponding series of air supply ports.

In the furnace hereinafter described, the arrangement of the retorts or muffles is duplex, in the sense that the combustion chamber is practically divided into two compartments merging at the top in a central down-take, whose walls serve to support the shelves or ledges upon which rest the rear ends of the retorts. Each of these compartments is heated in the same way, that is to say, from gas and air ports disposed alternately in longitudinal series along the base of the ledge-supporting wall.

In a symmetrical arrangement of duplicate compartments of this character, whose products of combustion are conducted through a down-take common to both, to an exit flue located at the extreme end of the furnace, the draft of the chimney upon the gas and air ports varies progressively from one end of each compartment to the other, and to such a degree that there is a corresponding non-uniformity of temperature conditions in the combustion chamber, the portions more remote from the exit end for the waste gases being less efficiently heated. As a consequence, in order that the charges in the retorts may be finished or worked off within practically the same working time, some sacrifice in the amount of the charge must ordinarily be tolerated in the less efficiently heated retorts.

My invention is designed to avoid this difficulty, so as to permit the retorts, whatever be their location with respect to the exit-flue of the combustion chamber, to be equally heated, and therefore to be worked off, with the maximum charge for each, in practically the same time, thereby proportionately increasing the output of the furnace as a whole. To this end, I supply both the air and the gas to the furnace, under pressure, from suitable mains and provide the branch pipes, leading from the respective mains to the air and gas ports of the combustion chamber, with independent regulating valves. By appropriately adjusting these independent valves, according to the pressures prevailing in the mains and according to the draft of the chimney, I am thus enabled to realize with substantial accuracy equalized conditions of temperature throughout the entire length of both compartments of the combustion chamber,—a result which, so far as I am aware has not been heretofore accomplished in furnaces of this type.

In the accompanying drawing Figure 1 represents a cross-sectional view, partly in elevation, and partly broken away, of a zinc retort furnace embodying my improvements; Fig. 2 represents a longitudinal sectional view thereof taken in part on a central plane, and, in part, on a plane indicated by the irregular dotted line 2—2 of Fig. 1.

Similar letters of reference indicate similar parts throughout the several views.

Referring to the drawing, A indicates the supporting foundation for the retort chamber B, which, as shown, is divided into two compartments having a central longitudinal downtake *b*, which communicates at one end of the furnace with a suitable flue *c* leading to the chimney stack C. The retorts *d* for receiving the charge of zinc ore and reducing material are supported in the usual manner in an inclined position, and rest with their rear ends upon the ledges *e* which are supported by the vertical walls *f* of the downtake *b*, said walls being suitably buttressed by the arches *h*.

At the base of each of the compartments of the combustion chamber are located a series of air ports and a series of gas ports, which are preferably assembled in pairs and alternating with each other, the pairs being preferably spaced at substantially equal distances apart, so as to control the temperatures prevailing in the respective

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zones of the furnace to which they severally belong. The air ports *i* communicate with an air pressure main D, through the instrumentality of a series of branch pipes *m*, each of which is provided with a regulating valve *n* for controlling the supply of air therethrough. So also, the gas ports *a* are connected to a gas pressure main E through the instrumentality of a series of branch pipes *s*, each of which is provided with a regulating valve *t* for controlling the amount of gas passed therethrough. The air pressure main D and the gas pressure main E for each compartment of the combustion chamber are conveniently located in the arched tunnel F and may be supported, as shown, upon the tie rods *v*, or otherwise.

The mode of operation of the furnace will be apparent.

By means of the regulating valves for the air and gas ports, the relative quantities of air and gas to obtain an equalized combustion throughout the length of both compartments of the combustion chamber may be accurately determined by the skilled operator, or may be varied from time to time as circumstances may require.

Having thus described my invention, what I claim is:—

1. A zinc retort furnace, provided with a combustion chamber having an exit flue for the products of combustion at one end thereof, zinc retorts located within the chamber, a series of air ports and a series of gas ports opening into the combustion chamber below the retorts, an air pressure main and a gas pressure main communicating with the said air and gas ports respectively, and valves for controlling independently the air supply and the gas supply from the mains to each of the air and gas ports; substantially as described.

2. A zinc retort furnace, provided with a combustion chamber having two compartments with a central downtake, an exit flue for the products of combustion communicating with the downtake at one end of the chamber, zinc retorts located in the compartments, a series of air ports and a series of gas ports opening into each compartment below the zinc retorts, an air pressure main and a gas pressure main communicating with the air ports and gas ports respectively, and valves for controlling independently the air supply and the gas supply from the mains to each of the air and gas ports; substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

CHARLES A. H. DE SAULLES.

Witnesses:
A. D. TERRELL,
BLANCHE GOES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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DOCUMENT INFO

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Filename: 1916-05 Gas Sheet 7.pdf

DOCUMENT INFO

7

MAY 916
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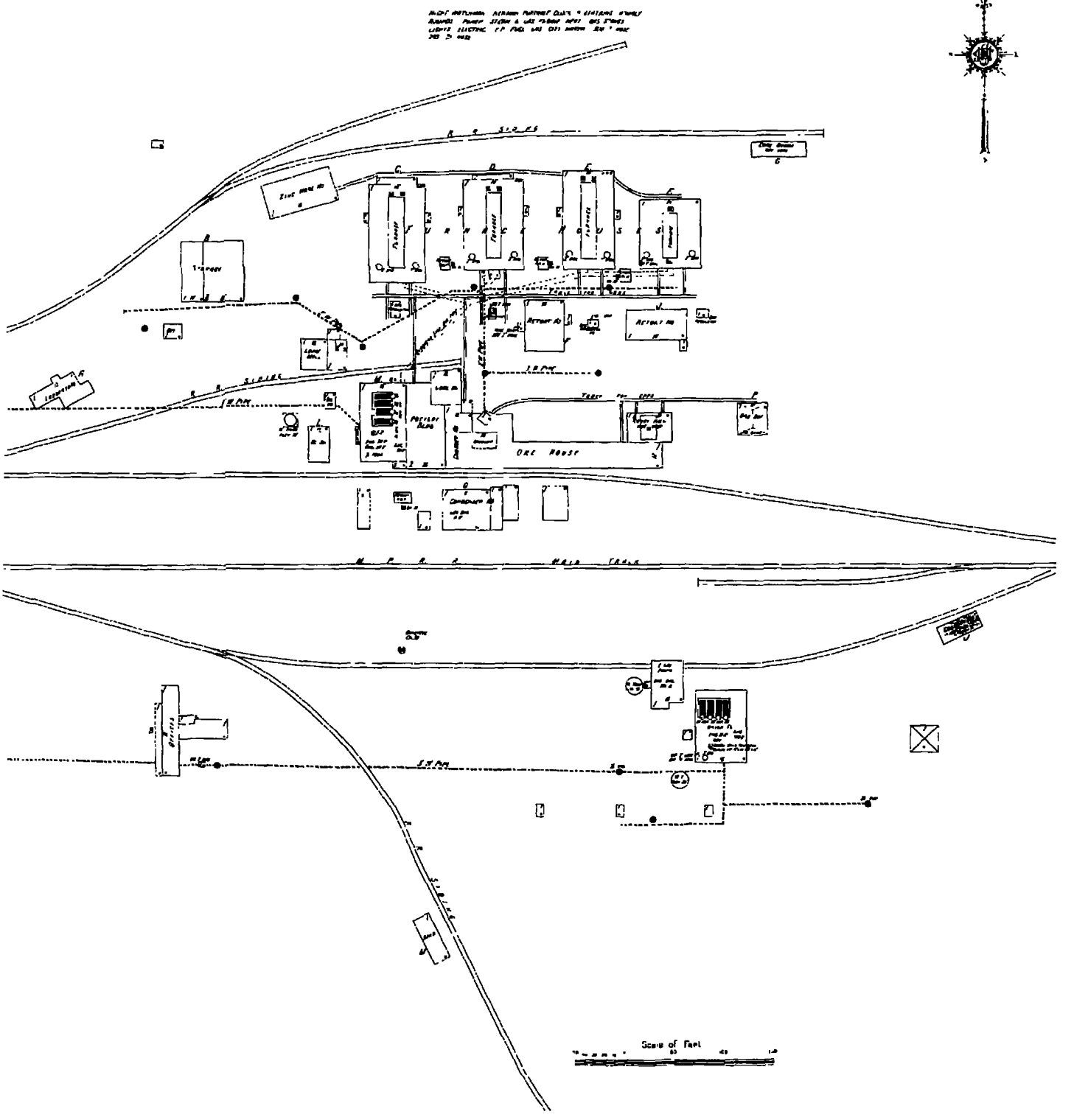
PRIME WESTERN SPELTER CO. SMELTER WORKS Nº 1.



DOCUMENT INFO

EDFolder: D:\Question 09\Presentation Cited Docs\Prime Western\

Filename: 1918-03-01 Tornado property loss reported.pdf

DOCUMENT INFO

THE IOLA DAILY REG

VOLUME XXI. NO. 109. The Daily Register, Established 1897. The Weekly Register, Established 1867. IOLA, KAS., MARCH 1, 1918—FRIDAY EVENING. Successor to The Iol Iola Daily Record an

TORNADO PROPERTY LOSS REPORTED

ALLEN COUNTY SUFFERED WORST FROM NEAR-HURRICANE.

YATES CENTER MUCH DAMAGED

PRESBYTERIAN CHURCH TO BE REBUILT AT ONCE.

Prime Western Officials Await Word from New York Offices—Street Cars to Run Soon.

The loss caused by the windstorm which nearly reached the proportions of a hurricane Wednesday night is now conservatively placed at one hundred thousand dollars. Confirmed reports from the nearby districts in the path of the storm indicates that none suffered as heavily as Iola and Elm townships.

Wire service to Kansas City and neighboring districts was restored today. After a period of isolation of practically twenty-four hours from the outside world except through railroad lines, it has developed that many exaggerated rumors were widespread. One correspondent gave the report that one-half million dollars worth of property was damaged. Wierd stories of fires and wrecks were common. Tales to the effect that people were panic-stricken are absurd.

Today this section has apparently recovered from the shock. Allen county is in the area extending from northeast Oklahoma to southwest Iowa in which storms occurred according to weather reports. A terrific wind struck this section in a 60-mile gale which blew for one hour Wednesday night. Allen county received a rainfall of .88 inches. The rain broke a six-month drouth, the worst in history. The last rain fell in the latter part of August. Many heavy snows have visited this country but the precipitation was light. The rain [illegible]

THE WEATHER.

FORECAST FOR KANSAS: Fair tonight and Saturday, warmer; continued mild temperature over Sunday.

Temperature—Highest yesterday 35, at 7 a. m.; lowest last night, 26, at 7 a. m.; normal for today, 38; deficiency yesterday, 6; deficiency since January 1st, 161.

Precipitation for the 24 hours ending at 7 a. m. today, .01; total for this year to date, 1.81 inches; deficiency since January 1st, 34 inch.

Relative humidity at 2 p. m. yesterday, 91 per cent; 7 a. m. today, 92 per cent; barometer reduced to sea level, 30.36 inches.

thrown out of employment at each plant. The pay on the furnaces ranges from three dollars per day to six. The monthly payroll at the two plants totals thousands of dollars.

The furnace workers especially are very anxious to hear the news from the company headquarters. The employees of these two plants have worked continuously for practically twenty years.

Street Cars Next Week.

Manager Louis Lannigan of The Iola Electric Railway Company expects to operate two cars by the first of next week at the latest. United Iron Works machinists and helpers are working on the steam "headers" and brick layers are rebuilding the smoke stack at the power house. As soon as these repairs are made the linemen will have the trolley wires up again. Lannigan has two cars, one in Iola and one in Gas ready to move as soon as the juice is turned on at the power house. The single truck car in the car barn will be repaired for use. The three big cars were wrecked beyond repair.

One of the most remarkable things about the Presbyterian church wreckage is that the four beautiful stained glasses on the north and south walls of the church remain unharmed. The south and west walls were damaged worst. The east and north walls will not be rebuilt in all probability. The bell in the tower fell and smashed the entrance of the edifice. The $10,000 pipe organ was crushed by the falling stone and brick. The lower hall was jammed full of the debris but the Sunday School room is practically uninjured.

Begin Work on Church at Once.

A meeting of the officers of the church was held yesterday afternoon and it was decided that just as soon

JAPAN'S PROPOSAL IS GIVEN ATTENTION

PRESIDENT WILL EXCHANGE VIEWS WITH ALLIES.

JAPAN WOULD BE WELCOME

BRITISH PAPERS BELIEVE THEY SHOULD BE TRUSTED.

Her Proposal Regarding Siberia is Widely Commented Upon by the London Newspapers.

(By the Associated Press)

Washington, Mar. 1.—Japan's proposal for action in Siberia has crowded General von Hertling's speech into second place in consideration of officials here and there were indications today that decisions were being formed which soon would show themselves in some arrangement of an international character to prevent the vast stores of Vladivostok and control of the trans-Siberian railway from falling into hands of the advancing Germans.

The expectation that Presidet Wilson was planning to address Congress very soon in reply to von Hertling's speech was dissipated today by evidence that the President is making no such plans at this time and probably does not consider it necessary to reply to the German Chancellor for the present at least. Before the President speaks there doubtless will be an interchange of views with London and Paris so that if Mr. Wilson speaks he will express the view of all the co-belligerents as on previous occasions.

Outward indications today were that the President was studying the question of America's participation with the Japanese in Siberia to the exclusion of other subjects.

London, March 1.—Japan's proposals with regard to Siberia and their reception at Washington has brought

German Anti-Tank Gun Captured by New Z

GERMAN ANTI-TANK GUN CAPTURED BY [illegible]

This was the deadly weapon captured by New Zealanders on the British front in [illegible] there. It is an anti-tank gun, turreted and anchored like a large gun on a battleship. [illegible] tridges used on the tank guns, but the New Zealanders managed to take it with the Ger

CONSUL LEAVES PETROGRAD

THE BRITISH AND FRENCH EMBASSIES ALSO DEPART.

Nothing But the Most Meager Dispatches Are Coming Through From Russia.

British Steamer Torpedoed.

An Atlantic Port, Mar. 1—The British freight steamship Manhattan of 804 tons gross, was torpedoed and sunk while in convoy of war ships and within hailing distance of an American merchant ship, it was learned today upon the arrival here of an American oil tanker.

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inches. The rain broke a six-month drouth, the worst in history. The last rain fell in the latter part of August. Many heavy snows have visited this country but the precipitation was light. The rain and snow throughout the state was just in time to rescue the perishing wheat. The winter wheat was ready to give up the fight for life when the rain descended, giving more moisture than had previously fallen in six months. The precipitation was heavier than any former twenty-four hour period since August.

Telephone Wire Entanglement.

A view of the wreckage today shows several hundred telephone poles down. One of the most peculiar sights was between Iola and Gas where telephone poles are down on both sides of the line and the wire was twisted and wrapped around fences resembling barb wire entanglements used in modern warfare.

Scores of farmers were in town late yesterday afternoon and early this morning to file claims for loss of barns, outbuildings, farm implements, livestock and minor properties which were partially covered by insurance.

Losses Only Partially Covered.

It was learned today that three of the heaviest losers in the storm the Presbyterian church congregation, the Prime Western Smelter Company and The Iola Electric Railway Company, hold tornado and storm insurance policies but they were small. The Iola Electric Company does not have a policy covering the loss on the power plant and car barns. The Prime Western loss was covered by half. The Presbyterian church was damaged to the extent of $20,000 and a policy of $7,000 partially covers the loss.

A canvass of the insurance men of the city reveals the fact that one hundred and seventy five barns had been lost. It will be months before all the claims can be settled.

Seven Furnace Blocks Working.

The Prime Western officials in the local offices were unable to make any statement this morning whether or not the furnace sheds would be rebuilt. One of the officers from the general manager's office of Chicago arrived in Iola today. It is understood that they are awaiting the official sanction of the New York offices of the New Jersey Zinc Company of which the local company is a subsidiary, before beginning work. It is estimated that it would take at least two months to replace the blocks. The furnace walls are undamaged and the retorts filled with the melting ore, which had been drawn only once by the metal drawers, have fallen to the bottom.

Only three blocks were operating at plant No. 5, three-quarters of a mile east of Iola. One was on dead-fire and another had not been operated for some time. All were lost by the fire, however. It is estimated that between ten and fifteen night men were on the job when the twister struck the sheds.

Begin Work on Church at Once.

A meeting of the officers of the church was held yesterday afternoon and it was decided that just as soon as the insurance adjuster had passed on the claim, plans would be made for rebuilding the church. Workmen were engaged at once in tearing down the loose brick and stone on the remaining walls to make the building safe. The benches and other furniture of the building have been placed under cover to prevent further loss.

It was announced that the regular Sunday morning service would be held in the Reformed church which the officers have so generously offered. According to previous arrangements a union service of the congregations of the Presbyterian and First Methodist churches will be held in the First M. E. church Sunday evening. Mr. Grace F. Scott has been asked to address the united bodies on the subject "The Horrors of the War" on this occasion.

Woodson Court House Struck.

Yates Center, Kas. Feb. 28.—For the first time in its history Yates Center and Woodson county were visited by a tornado Wednesday night which left a path of ruin and panic-stricken people in its wake. The big twister caused great damage but no estimate could be placed on the loss tonight.

The court house is badly wrecked and the grounds is a mass of debris. The Methodist church suffered much damage, the tower and a portion of the roof being torn off and the main auditorium flooded.

Town Left In Darkness.

The electric light plant was one of the first buildings to go, leaving the town in darkness and adding terror to the already frightened people. All communication with the outside world was cut off. Hail followed the wind and then rain which fell in torrents, increasing the damage wrought by the twister.

Tops of many homes and business buildings were torn off, trees uprooted and dwellings damaged. Streets are strewn with broken glass and other debris.

Only a few days ago the Woodson County Stock Show Association made arrangements to lift the indebtedness on the show grounds. This morning the buildings were a mass of boards splintered and twisted into kindling wood.

Teacher Averted a Panic.

A panic at the high school gymnasium, where a basket ball game was in progress, was averted by the presence of mind of Miss Irma Lewis, music instructor, who forced the crowd to sing. The roof was blown off, but no one was injured.

The farm of H. T. Laidlaw, a prominent hay and cattle dealer, is a total wreck and many cattle are dead. The home of Mr. and Mrs. Anderson, south of the Santa Fe depot, is scattered all over an 80-acre field. Mr. Anderson was blown quite a distance but was

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London, March 1.—Japan's proposals with regard to Siberia and their reception at Washington has brought the question of Japan's active participation in military operations to the forefront here, the developments dominating the news columns of the papers. A Reuter cablegram quoting an Associated Press dispatch from Washington is given great prominence in type and position by the morning newspapers and is commented upon extensively. Some papers display contributed articles setting forth the Japanese view of the situation.

The bulk of the opinion favors Japan's proposed action without qualification and the plea is made in some quarters that she ought implicitly to be trusted and given a free hand.

Sentence Again Extended.

(By the Associated Press)

Oklahoma City, Okla., March 1.—Inquiries addressed to the office of Governor R. L. Williams today disclosed the information that the stay of execution recently granted Quillie McConnell self-confessed slayer of Sheriff George Arnold of Lincoln county, has been extended to this time to April 28.

Lost Ten Steamer Sunk.

(By the Associated Press)

New York, March 1.—The British merchant steamer Tiberia of 4,850 tons gross, owned by the Anchor Line, was sunk by a German submarine about February 27 while bound for this port according to information received in shipping circles today. The crew was rescued.

Germans Attack on Aisne.

(By the Associated Press)

Paris, March 1.—After a violent bombardment last night the Germans made an attack on the Aisne front east of Chavignon, the war office announced. A violent hand to hand struggle followed terminating to the advantage of the French who threw back the Germans and inflicted heavy losses on them.

Government Buying Corn.

(By the Associated Press)

New York, March 1.—Corn to the amount of from five hundred thousand to 750 thousand bushels a day will be purchased during the next three weeks at the various mid-western grain exchanges by federal committees for use abroad, it was announced today.

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in the storm and the engineer blown from his seat and his face cut by flying glass. Wreckage piled on the track just south of Humboldt also delayed traffic. The Santa Fe stations at Cambridge, Longton, Grenola and Moline were wrecked. The operator at Cambridge was reported injured.

Moisture Helped Wheat.

Abilene, Kas., Feb. 28.—Sleet and wind last night and this morning

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From Russia.

(By the Associated Press)

Stockholm, Feb. 28.—The American consul has left Petrograd where he remained after the embassy's departure, according to information reaching the American legation here. The consulate has been taken over by the Norwegian consul.

This bare report appears to indicate that the situation in Petrograd has taken an unexpected turn for the worst. In view of the fact that the latest previous messages from the Russian capital said that the American consul would remain there after the departure of the ambassador and his staff in order to keep in touch with the American legation here and the State Department.

News agencies, the press and diplomatic here are without any but the most meagre dispatches from Petrograd in the last twenty-four hours.

London, Mar. 1.—The British and French embassies have left Petrograd according to a telegram from the Russian official news agency in Petrograd which bears no date.

The Russian Council of Peoples Commissaries has decided to return to Petrograd, the official Russian statement says.

Vologda, Russia, Feb. 28.—The American and Japanese ambassadors arrived here today on a special train. Their trip was an uneventful one. The Chinese and Siamese ministers, the Brazilian charge d'affaires and the American Red Cross representatives have also arrived here. The ambassadors are remaining in Vologda pending developments. Another train which reached Petrograd with portions of the embassy staffs has arrived at Vatka (359 miles east of Vologda).

Washington, Mar. 1.—The committee on public information announced today from official advices from its representative in Petrograd that Ambassador Francis and his staff, the American consulate the military mission, and the Red Cross Representatives all left Petrograd for Vologda by railroad on the night of February 27th.

The advice came by cable from Edgar Sisson, the committee's representative in the Russian capital.

Representatives of the information committee it was said today, will remain in Petrograd for the present to carry on the educational and informational work with which they are charged. Latest reports show that the circulation of the President's address on January 8 is practically completed throughout Russia. The total, it is said, is over four million copies, including separate reprints and dis-

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rival here of an American oil tanker.

MUST SEND ROAD BOOSTERS

Allen County Must Wake Up and Meet Ft. Scott-Wichita Highwaymen at Ft. Scott.

Road boosters of Allen county are out this week promoting interest in the Ft. Scott-Wichita highway meeting in Ft. Scott, Tuesday, March 5, which will be attended by J. Frank Smith, president of the Kansas Good Roads Association, and members of the Kansas State Highway Commission, with the view of securing a good delegation to represent the county at the approaching event.

Other counties have reported good delegations will be in attendance and it is time for Allen county to wake up to the realization that she must meet the other counties if she expects to be on the road map. The Wichita to Ft. Scott trail passes through Iola, Iola, Gas, LaHarpe and Moran. Each of these towns and the countryside should be represented.

Several car loads are expected to go from Iola and Moran and the farmers who have cars are urged to drive over.

The meeting is of importance. Plans for a better road program on this entire route will be outlined. The road live wires of the state will be at the meeting. Allen county must fall in line. Your attendance at Ft. Scott will give reasonable assurance that you are boosting Allen county.

VISITED IOLA'S ELECTRIC PLANT

Committee of Ottawa Women Inspected Records and Filed Report.

The women of Ottawa are taking a hand in politics and there has been so much discussion about Iola's municipal light, power and gas plants that a committee of four women inspected the plants Wednesday, Feb. 27, visited with the commissioners and a two column report of the findings was made in the Ottawa Daily Herald.

Mrs. E. S. Sheldon, Mrs. Clarence A. Washburn, Miss Florence Robinson and Mrs. R. C. Dugan formed the party. The report covers the rates and system employed by the Iola commissioners deriving municipal funds from the plants.

Mooney Will Hang.

(By the Associated Press)

San Francisco, March 1.—Thomas J. Mooney must hang as a result of conviction on a murder charge growing out of bomb explosions which killed ten persons in 1916, unte-

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morning to file claims for loss of barns, outbuildings, farm implements, livestock and minor properties which were partially covered by tornado insurance.

Losses Only Partially Covered.

It was learned today that three of the heaviest losers in the storm the Presbyterian church congregation, the Prime Western Smelter Company and The Iola Electric Railway Company held tornado and storm insurance policies but they were small. The Iola Electric Company did not have a policy covering the loss on the power plant and car barns. The Prime Western's loss was covered by half. The Presbyterian church was damaged to the extent of $20,000 and a policy of $5,000 partially covers the loss.

A canvass of the insurance men of the city reveals the fact that one hundred and seventy-five farms had been hit. It will be months before all the claims can be settled.

Seven Furnace Blocks Working.

The Prime Western officials in the local offices were unable to make any statement this morning whether or not the furnace sheds would be rebuilt. One of the officers from the general manager's office of Chicago arrived in Iola today. It is understood that they are awaiting the official sanction of the New York offices of the New Jersey Zinc Company, of which the local company is a subsidiary, before beginning work. It is estimated that it would take at least two months to replace the blocks. The furnace walls are undamaged and the retorts filled with the melting ore, which had been drawn only once by the metal drawers, have fallen to the bottom.

Only three blocks were operating at plant No 3, three-quarters of a mile east of Iola. One was on dead-fire and another had not been operated for some time. All were lost by the fire, however. It is estimated that between ten and fifteen night men were on the job when the twister struck the sheds. One fireman, one metal drawer, a "stuffer" in each block, and several watchmen and relief men were in the sheds also.

At the Gas City plant No. 1 four blocks were running and one was on dead-fire. All were a total loss. The night men fought the flames with the company fire-fighting apparatus but the water pressure was weak and there was small chance of saving the wooden structures under control of such a terrific wind, which changed its course at times. Between fifteen and twenty men were in the furnace houses at the plant.

Heavy Loss of Payroll.

It is estimated that fully eighty furnace men and one hundred ore men, mixers, yard employees, repairmen, fuel workmen and machinists were

Yates Center, Kas., Feb 28.—For the first time in its history Yates Center and Woodson county were visited by a tornado Wednesday night which left a path of ruin and panic-stricken people in its wake. The big twister caused great damage but no estimate could be placed on the loss tonight.

The court house is badly wrecked and the grounds is a mass of debris. The Methodist church suffered much damage, the tower and a portion of the roof being torn off and the main auditorium flooded.

Town Left in Darkness.

The electric light plant was one of the first buildings to go, leaving the town in darkness and adding terror to the already frightened people. All communication with the outside world was cut off. Hail followed the wind and then rain which fell in torrents, increasing the damage wrought by the twister.

Tin roofs on many homes and business buildings were torn off, trees uprooted and dwellings damaged. Streets are strewn with broken glass and other debris.

Only a few days ago the Woodson County Stock Show Association made arrangements to lift the indebtedness on the show grounds. This morning the buildings were a mass of boards whipped and twisted into kindling wood.

Teacher Averted a Panic.

A panic at the high school gymnasium, where a basket ball game was in progress, was averted by the presence of mind of Miss Irma Lewis, music instructor who forced the crowd to sing. The roof was blown off, but no one was injured.

The farm of H T. Laidlaw, a prominent hay and cattle dealer, is a total wreck and many cattle are dead. The home of Mr. and Mrs. Anderson, south of the Santa Fe depot, is scattered all over an 80-acre field. Mr. Anderson was blown quite a distance, but was unhurt. The roof of the McBride home was raised and jammed into the dwelling. Mrs McBride escaped by crouching in a closet. Mayor Bowen drafted men to help clear away the debris at the light plant and it may give service in a few days.

Unroofed Santa Fe Station.

Chanute, Kas., Feb. 28.—The terrific storm of last night unroofed smelters at Gas City, causing fires. The storm, which came from the west, swept a path twenty miles wide from Humboldt to Colony. At Petrolia, five miles north of Chanute, the engine house of the Kansas Natural pumping plant was unroofed and other damage done.

The Bell Telephone Company reports fifty-two poles down and the Western Union two hundred. A Santa Fe train from Kansas City was caught

[...] to Williams today [...] the information that the stay of execution recently granted Quillie McConnell self-confessed slayer of Sheriff George Arnold of Lincoln county, has again been extended [...] this time to April 26.

4,800 Ton Steamer Sunk.

(By the Associated Press)

New York, March 1.—The British merchant steamer Tiberia of 4,800 tons gross, owned by the Anchor Line, was sunk by a German submarine about February 27 while bound for this port, according to information received in shipping circles today. The crew was rescued.

Germans Attack on Aisne.

(By the Associated Press)

Paris, March 1.—After a violent bombardment last night the Germans made an attack on the Aisne front east of Chavignon the war office announced. A violent hand to hand struggle followed terminating to the advantage of the French who threw back the Germans and inflicted heavy losses on them.

Government Buying Corn.

(By the Associated Press)

New York, March 1.—Corn to the amount of from five hundred thousand to 750 thousand bushels a day will be purchased during the next three weeks at the various mid-western grain exchanges by federal committees for use abroad, it was announced today.

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in the storm and the engineer blown from his seat and his face cut by flying glass. Wreckage piled on the track just south of Humboldt also delayed traffic. The Santa Fe stations at Cambridge, Longton, Grenola and Moline were unroofed. The operator at Cambridge was reported injured.

Moisture Helped Wheat.

Abilene, Kas., Feb 28.—Sleet and wind last night and this morning wrecked over fifteen miles of telephone toll lines in the territory from Lincoln and Ellsworth to Topeka, causing $7,000 damage. While the moisture was light, it has been helpful to wheat, which is just turning green.

The Kansas City Southern yesterday afternoon repaired its lines south of here that were blown down in the windstorm. The company reported the storm had damaged Amoret, Amsterdam, and Merwin, small Missouri towns about sixty miles south of Kansas City.

The Western Union Telegraph Company has been unable to establish connections with Moran and LaHarpe, Kas., where, according to a report received by the company, the railway depots of the Missouri Pacific were blown away.

[...] grad in the last twenty-four hours.

London, Mar. 1.—The British and French embassies have left Petrograd according to a telegram from the Russian official news agency in Petrograd which bears no date.

The Russian Council of Peoples Commissaries has decided to return to Petrograd, the official Russian statement says.

Vologda, Russia, Feb. 28.—The American and Japanese ambassadors arrived here today on a special train. Their trip was an uneventful one. The Chinese and Siamese ministers, the Brazilian charge d'affaires and the American Red Cross representatives have also arrived here. The ambassadors are remaining in Vologda pending developments. Another train which reached Petrograd with portions of the embassy staffs has arrived at Viatka (370 miles east of Vologda).

Washington, Mar. 1.—The committee on public information announced today from official advices from its representative in Petrograd that Ambassador Francis and his staff, the American consulate, the military mission, and the Red Cross Representatives all left Petrograd for Vologda by railroad on the night of February 27th.

The advice came by cable from Edgar Sisson, the committee's representative in the Russian capital.

Representatives of the information committee, it was said today, will remain in Petrograd for the present to carry on the educational and informational work with which they are charged. Latest reports show that the circulation of the President's address on January 8 is practically completed throughout Russia. The total, it is said, is over four million copies, including separate printing and distribution and at Tiflis, Vladivostok, Odessa, Rostov, Omsk and Chita but not including 1,500,000 newspaper articles and an incalculable amount of partial printing and editorial comment which followed.

In addition, it was said 1,300,000 messages printed in German went through the northern lines of the German army. About 200 thousand were successfully worked through the southern and central fronts.

The committee also said that German and Austrian officers in Russia were provided with copies of the address.

Fair Food Board Meets.

The Iola fair food board will meet this evening in the city hall. Every merchant in Iola is urged to attend.

Other counties have reported good delegations will be in attendance and it is time for Allen county to wake up to the realization that she must meet the other counties if she expects to be on the road map. The Wichita to Ft. Scott trail passes through Piqua, Iola, Gas, LaHarpe and Moran. Each of these towns and the countryside should be represented.

Several car loads are expected to go from Iola and Moran and the farmers who have cars are urged to drive over.

The meeting is of importance. Plans for a better road program on this entire route will be outlined. The road live wires of the state will be at the meeting. Allen county must fall in line. Your attendance at Ft Scott will give reasonable assurance that you are boosting Allen county.

VISITED IOLA'S ELECTRIC PLANT

Committee of Ottawa Women Inspected Records and Filed Report.

The women of Ottawa are taking a hand in politics and there has been so much discussion about Iola's municipal light, power and gas plants that a committee of four women inspected the plants Wednesday, Feb 27, visited with the commissioners and a two column report of the findings was made in the Ottawa Daily, the Herald.

Mrs E. S. Sheldon, Mrs. Clarence A. Washburn, Miss Florence Robinson and Mrs R C Dugan formed the party. The report covers the rates and system employed by the Iola commissioners deriving municipal funds from the plants.

Mooney Will Hang.

(By the Associated Press)

San Francisco, March 1.—Thomas J. Mooney must hang as a result of conviction on a murder charge growing out of bomb explosions which killed ten persons in 1916, unless executive clemency intervenes the state supreme court decided here today in denying his application for a new trial.

Huns Reach Dnieper River.

(By the Associated Press)

Berlin, via London, Mar. 1.—German troops continuing their advance in Russia have reached the Dnieper river, the war office announces. The Austro-Hungarian troops have begun an advance into Ukraine.

Sen Smith Not a Candidate.

(By the Associated Press)

Washington, Mar. 1.—Senator William Alden Smith, of Michigan, a Republican leader in the Senate, announced today that he would not be a candidate for re-election but would leave the Senate when his term expires March 4, next.

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Filename: 1918-05 Zinc-Notes on Iola Reconstruction.pdf

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A Monthly Magazine Published by The New Jersey Zinc Company

EDITORIAL STAFF

W. H. SHEARMAN, *Editor*

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Denver, Colo. A. J. HIESTER	Depue, Ill. C. C. NITCHIE	Franklin, N. J. M. M. DOLAN	Galena, Ill. W. F. BOERICKE
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It has been administered by the United States since 1900, and the record of the steps taken to safeguard the health of the inhabitants and to promote order and good government reflect great credit on the administration. The Virgin Islands, recently purchased from Denmark are three tiny islands lying east of Porto Rico and totaling together an area of only 138 square miles. Their population in 1911 was 27,086. In part their value is sentimental, in part strategic and political. Their population has been steadily declining, since their trade is small and the freed negroes who compose the population are of a poor order. They add little to the prestige and power of the United States, but their proximity to Porto Rico and the obvious interest Germany has been taking in the Islands made their acquisition a matter of statesmanship.

Zinc Notes

Canon City

F. F. Joel, who has been in charge of the metallurgical calculations at this plant for several years, and who has acted as local correspondent for ZINC, has been compelled to resign his position on account of ill health.

J. E. Overman, general forman, recently spent some time at Camp Kearney, California, visiting his son, who was formerly employed at this plant. The latter has been in military service for nearly two years, having spent considerable time on the Mexican border with the Colorado National Guard, and is now in an officers' training camp.

J. H. Galley, of the clerical force, is the proud possessor of a recently purchased Chandler "Chummy Roadster."

H. M. George, Chief Chemist, and his staff of assistants, are much pleased with the new laboratory.

Since the completion of the laboratory, L. A. Desjardins, who was its architect, and who had charge of the construction work, is temporarily occupied with other matters for the Canon City plant.

Cleveland

J. H. Haigh, of Denver, visited the Cleveland mine on business April 6.

C. T. Brown and Soren Ringlund were visitors at the Cleveland mine during the latter part of March.

Denver

E. E. Schwegler, of the Denver Accounting Dept., spent most of the month of April on an auditing trip to the Company properties in the Southwest.

W. M. Traver, Jr., formerly Mining Engineer at the Kelly mine has been promoted to the rank of corporal in Company C of the 28th Engineers.

On the afternoon of April 16th, the employees of the Denver Office listened to stirring speeches by Rev. A. H. C. Morse and Judge E. C. Stimson on the subject of the Third Liberty Loan.

John F. Bynon, of the Denver Engineering Department, expects to leave shortly for Southern California where he will enter training in the Hydroplane Service of the U. S. Navy.

W. S. Nicoll, of the Denver Purchasing Department, will leave the latter part of April for Camp Funston, Kansas, where he will enter the National Army.

Mr. R. R. May, of Gilman, Colorado, stopped for a few days in the Denver office during April enroute to Hanover, New Mexico, where he will be located for an indefinite period.

J. T. Boyd, of the Eagle mines, was a Denver visitor the fore part of April.

EPA7-002062

Mr. and Mrs. W. C. Nestor and Mr. and Mrs. M. M. Dolan, both girls, via the Hospital.

Twenty-two cases over a wide territory were aided by the Franklin Hospital Auxiliary from June 1st to date according to a report just received. Twelve of these cases were surgical and ten were medical and embraced a variety of afflictions.

One bed fund is maintained by the borough of Franklin, one by Sussex and Wantage combined, and three by the Hospital Auxiliary for patients outside of these districts who need treatment and are unable to pay for it.

The distribution of the funds for the free beds were as follows from June to date: Franklin Hospital Auxiliary Bed, 12; Sussex and Wantage Free Bed, 5; Franklin Borough Free Bed, 5; The following towns were represented in this distribution: Newton, Sussex, Hamburg, Ogdensburg, Milton, Oak Ridge, Branchville, Wantage Township and Franklin.

The dance for the benefit of the Auxiliary which was held last Friday night was well attended, about 150 people being present. Exactly how much money was taken in at the affair has not yet been announced but it is estimated that it will reach around $80.00. Because of the bad weather the dance was given at the Neighborhood House instead of the Vocational School which is some distance away from the center of town.

Galena

The funeral of L. D. Adams was held on Saturday, March 23, and was largely attended by his many friends from here as well as the nearby towns and the mines. The floral pieces were particularly beautiful, and the casket was fairly covered with flowers. The pallbearers were George Baker, Roy Cole, Charles Gillette, E. Claussen, Theo. Polhemus, and W. F. Boericke. Among the honorary pallbearers were Messrs. Thacher, Hoskins, Place, Potter, Stoval, Pincon, Barrett, and Ware. Interment was made in Greenwood Cemetery, Galena.

John Christy, electrician for the Company, was badly shocked when working near the high tension line at the Penna mine, but after a few days layoff, was able to be about again, none the worse for the accident.

Mr. Thacher spent a few days in Galena with Mr. Hoskins.

Iola

The reconstruction of the furnace buildings at Works No. 3 is now completed and all the furnaces are in operation. Block No. 4 was charged on April 5th, Block No. 3 on the 14th and Block No. 2 and the refinery were charged on the 19th. The new buildings are better constructed than they were originally and the plant is in better condition than before the storm.

R. B. Boone, Jr., who has worked in the Iola offices for the past six years will leave soon after the first of May for Portland, Ore., and other points in the north-west where he expects to reside.

P. C. Class, who succeeded F. O. Russell in the Iola offices, has accepted a position with the Lehigh Portland Cement Co., of this city, and is succeeded by L. E. Rogers, of the Gas and Fuel Department.

Marion Dorsett, of Works No. 3, office has accepted a position with the Empire Gas Co., at Eldorado, Kans.

Word received from Howard Lawyer who recently left Iola offices to enlist in the clerical work of the aviation department at Waco, Tex., states he likes his work fine altho he is spending much time in digging trenches and doing other "clerical" work.

H. G. Hixon, of Chicago, and J. D. James, of Palmerton, arrived in Iola April 11th. Mr. James is superintending the operation of the new refinery during its early stages.

Mr. Coursen was in Iola the 12th and 13th of April.

E. B. Heylmun, formerly of the office at Works No. 3, and three other Iola boys were commissioned 2nd Lieutenants April 5th at Camp Doniphan after a strenuous three months course in the Officer's Training School. He is now at Camp Mills, L. I., ready for embarkation to France.

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DOCUMENT INFO

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Filename: 1920-12-16 Prime Western Spelter Deed.pdf

DOCUMENT INFO

TITLE DOCUMENT 20

GRANTOR:	Prime Western Spelter Company
GRANTEE:	J.B. Kirk Gas and Smelting Company
INSTRUMENT:	Warranty Deed
DATE:	12/16/1920
BOOK:	70
PAGE:	455
PARCELS:	1, 4, 3, 5

Deed 70, Pg 455

Deed

This Indenture Made this 16th day of December in the year of our Lord one thousand nine hundred and twenty (1920) between The Prime Western Spelter Company, a corporation of the State of Missouri, party of the first part, and The J.B.Kirk Gas & Smelting Company, a corporation of the State of ..... party of the second part,

Witnesseth , That the said party of the first part in consideration of the sum of One Dollar ($1.00) and other valuable considerations to it duly paid, receipt whereof is hereby acknowledged has sold and by these presents does grant and convey unto the said party of the second part its successors and assigns, the following described land and premises situate in Allen County,Kansas, to-wit,

All that part of the SoutheaSt Quarter (1/4) of Section twenty-five (25) Township twenty-four (24) RAnge eighteen (18) east of the Sixth P.M.more particulalty described as follows,to-wit,

Commencing at the southwest corner of the Southeast quarter (1/4) of above described Section, thence East twenty (20) rods, along the South line of said Quarter Section, thence North one hundred twenty (120) rods, thence WEst twenty (20) rods to the WEst line of said Quarter Section, thence due South one hundred twenty (120) rods to the place of beginning containing fifteen (15) acres, being the same premises conveyed to the party hereto of the first part by Mary E. Northrup by deed dated June 27,1920, and recorded in the office of the register of deeds in and for Allen County Kansas, on July 1, 1902, in book 33 on page 628.

EXcepting therefrom all oil, gas and mineral which bas heretofore been conveyed by the party hereto of the first part to The Elm Township Gas, light, Fuel & Power Company by deed dated February 17, 1906.

The above described premises are conveyed subject to a track agreement dated Mar.1, 1917 made between the party hereto of the first part and the Missouri Pacific Railway Company and subject also to a right of way of the Missouri Kansas & Texas Railway Company.

Also all that certain other tract or parcel of land situate in the said County of Allen and State of Kansas, to wit,

That part of the southwest quarter (1/4) of Section twenty-five (25) Township twenty-four (24) RAnge eighteen (18).

Commencing at a point seven hundred twenty-five (725) feet west of the Southeast corner of said Quarter Section, thence west three hundred seventy nine (379) feet more or less, thence North one thousand forty-four (1044) feet, thence East Three hundred seventy-nine feet more or less, thence South to place of beginning, being a tract three hundred seventy-nine (379) feet wide, more or less, and ten hundred forty-four (1044) feet long, containing about nine acres, and subject to the right of way and tracks as now located of the Missouri Pacific RAilway Company and the Missouri, Kansas & Texas Railway Company, being the same premises conveyed by The Iola Portland Cement Company by deed dated MAy 25, 1915,and recorded in the office of the said Register of Deeds on the 21st day of August 1915, in book 43 on page 75.

The above described premises are conveyed subject to a track agreement dated March 1, 1917 made between the party heretoof the first part and the Missouri Pacific Railway Company.

Also all that certain other tract or parcel of land situate in the said County of Allen and State of Kansas is described as follows, to-wit,

That part of the Southwest quarter (1/4) of Section twenty-five (25) Township Twenty-four (24) Range Eighteen (18).

Commencing at a point seven hundred (700) feet West of the Southeast corner of said Quarter Section, thence west twenty-five (25) feet, thence North one thousand forty-four (1044) feet, thence East twenty-five (25) feet, thence South to place of beginning, being a tract twenty-five (25) feet wide, lying immediately WEst and adjoining a tract heretofore sold to the grantor herein, being the same premises conveyed to the party of the first part by said The Iola Portland Cement Company by deed dated May 25, 1915, and recorded in the office of said Register of Deeds on August 21,1915, in book 59 on page 164.

Also all that plot or parcel of land situate in the said County of Allen and State of Kansas, to-wit,

Beginning at a point eleven hundred and five (1105) feet west of the Northeast corner of the Southeast quarter (1/4) of Section thirty-two (32) Township twenty-four (24) Range nineteen (19) thence running West thirty-eight one-hundredths (10.38) chains, thence east thirteen and one-half (13-1/2) chains, thence North ten and thirty-eight one hundredths (10.38) chains to the point of beginning, being part of the same premises conveyed to the party hereto of the first part by Mark T.Cox and Emily M.Cox, his wife, by deed dated October 30,1902, and recorded in the office of the said Register of Deeds on April 18, 1903 in book 30 of Deeds on page 352.

The premises lastly above described are conveyed subject to a right of way to the Missouri PAcific Railway Company and subject also to Industrial Track Agreement with Missouri Pacific Railway Company dated March 10, 1917.

Also all that tract or parcel of land situated i n the said County of Allen and State of Kansas and described as follows, to-wit,

lots No. Seven (7) and No. Eight (8) Block No. Two (2) in Taylor's second addition to Gas City, Kansas, according to the recorded plat thereof. Being the same premises conveyed to the party hereto of the first part by deed dated February 5, 1903, by E.K.Taylor, and recorded in the office of the said Register of Deeds on February 13, 1903, in book 37 at page 124. -

Excepting, however, from the premises lastly above described, all the oil, gas and mineral in and under said lands, and further excepting all rentals or dues that may accrue upon or under any oil, gas or mineral leases that are upon said land or any part of the same.

Also all that tract or parcel of land situated in the said Countyof Allen and State of Kansas and described as follows, to-wit,

U.S.R.S. CANCELLED $15.00

lot No. Five (5) Block No. Four (4) in the town of Rose Hill as shown on Plat filed in the office of the Recorder of Deeds of aforesaid County and State. Being the same premises conveyed to the party hereto of the first part by William A. West and Laura West, his wife, by deed dated August 16, 1902, and recorded in the office of the said Register of Deeds on August 22, 1902, in Book 36 at page 77.

Excepting from the premises lastly above described all oil and gas in and under the same,which said oil and gas were reserved tosaid William A. West and Laura West , his wife,by the last hove mentioned deed.

Also all the right, title, interest of the said Prime Western SPelter Company in and to all of the following described real property situated in the said County of Allen and State of Kansas, to-wit,

lots No. One (1) and No. Two (2) in Block Four (4) in the town of Rose Hill as shown on the plat filed in the office of the Register of Deeds of said County and State.Being the same premises conveyed to the party hereto of the first part by Carrington Ward Sexton by deed dated June 13, 1904, and recorded in the office of the said Register of Deeds on December 6,1920.

The premises lastly above described are conveyed subject to a certain oil and gas lease as shown of record.

Also all that tract or parcel of land situated in the said County of Allen and State of Kansas and described as follows, to-wit,

lot No. Six (6) Block No. Four (4) in the town of Rose Hill as shown by the recorded plat thereof. Being the same premises conveyed to the party hereto of the first part by lAura A. Scruggs and Groos V. Scruggs, her husband, by deed dated February, 11, 1903, and recorded in the office of the said Register of Deeds on February 13, 1903, in book 34 at page 334.

Also all that tract or parcel of land situated in the said County of Allen and State of Kansas described as follows, to-wit,

The South half (1/2) of the Southwest quarter (1/4) of the Northeast quarter (1/4) of section thirty-two (32) Township twenty-four (24) Range nineteen (19) Allen County, Kansas. Being the same premises conveyed to the party of the first part by Joesph A. DAly and Ollie Daly hisswife, and Leander T. McRae and Florence D. McRae, him wife, by deed dated December 1, 1898, a nd recorded in the office of the REgister of Deeds on December 10, 1898, in Book 23 of Deeds at page 305.

The premises lastly above described are conveyed subject to the right of way of The Missouri Pacific RAilway CoMpany, subject also to the right reserved by the grantors in the last above mentioned deed to pipe gas or water over or across said land, subject also to lease made by the party herstoof the first part to The Kansas & Colorado Pacific RAilway Company, dated January 31, 1902, subject also to and with the benefit of a certain agreement made between B.F. Bush as receiver of the Railroad and other property of The Missouri Pacific Railway Company and the party hereto of the first part, dated March 10, 1917, subject also to an oil loading right more fully described in a certain agreement between the party of the first part and The Miller Pipe-line Company, dated November 21, 1919.

Also all that tract or parcel of land situate in the said County of Allen and State of Kansas and described as follows, to-wit,

All that part of the Southwest quarter (1/4) of Section twenty-five (25) Township twenty-four (24) RAnge eighteen (18) east of the 6th P.M.described as follows , Beginning at the Southeast Corner of said Southwest Quarter (1/4(thence North ten hundred and forty-four (1044) feet, thence West seven hundred and twenty-five (725) feetm thence South ten hundred and forty-four (1044) feet to the South line of said Quarter Section, thence East seven hundred Twenty-five (725) feet to the place of beginning, containing seventeen and one fourth (17-1/4) acres, more or less.

Being part of the premises conveyed to the parties hereto of the first part by George K. Nicholson and Florence B. Nicholson, his wife, by deed dated July 1, 1902, and recorded in the office of the said Register of Deeds on July 1, 1902, in Book 33 of deeds at page 626.

The premises lastly above described are conveyed subject to a track agreement made between the party hereto of the first part and Missouri Pacific Railway Company, dated March 1, 1917, and subject alsqto the right of way and tracks of the said Railway Company and of the Missouri Kansas & Texas Railway Company now located thereon.

Also all the right, title and interest of the said Prime Western Spelter Company in and to all of the following described real estate, situated in the said County of Allen and State of Kansas,to-wit,

Commencing at a point in the center of the Missouri Pacific Main track and 1996 feet west of the East quarter (1/4) corner of Section thirty-two (32) Township twenty-four (24) Range Nineteen (19) being the Northwest corner of Prime Western Spelter's Company&s tract, thence South 89° 13' west (vary 9° 16'E) 650.4 feet to the west line of the Southeast quarter (1/4) of said Section 32, thence South 0° 45' East 1309.2 feet to the South line of the North one-half (1/2 of the Southwest quarter (1/4) of said Section 32, thence North 89° 20' East 1541.2 feet , thence North 0° 44 ' west 624 feet to the Southeast corner of the Prime Western Spelter Company's tract, thence South 89° 13' west 891 feet to the Southwest corner of Prime Western Spelter Company's tract thence North 0° 47' West 687 feet to the place of beginning,containing 32.32 acres, more or less. Being the same premises conveyed to the party hereto of the first part by Carrington Ward Sexton, by deed dated September 28, 1904, and recorded in the office of the said Register of Deeds on December 6, 1920.

The premises lastly above described are conveyed subject to one(1) certain oil and gas lease as shown of record.

To Have and To Hold the above granted premises, together with the appurtenances unto the said partyoof the second part, its successors and assigns,forever.

And the said party of the first part does covenant and agree that at the delivery hereof it is the lawful owner of the premises above granted and seized of a good and indefeasibl estate of inheritance therein, free from all encumbrances except as herein recited and that it will warrant and defend the same in the quiet and peaceful possession of the said party of the second part, its successors and assigns forever, against all persons lawfully claiming the same. subject as aforesaid.

In Witness Whereof, the said party of the first part has caused its corporate seal t be hereunto affixed and these presents to be subscribed by its Vice President and Assistant Sec retary the day and year first above written.

Prime Western Spelter Company,
By A.P.Cobb, Vice President.

Attest Seal, R.G.Hudson, Assistant Secretary.

State of New York, County of New York, ss

Be it remembered that on this 16th day of December,1920, before me, the undersign a Notary Public in and for the County and State aforesaid, came A.P.Cobb, Vice President of Prim Western Spelter Company, a corporation duly organized and incorporated and existing under and by virtue of the laws of the State of Missouri, and R.G.Hudson, Assistant Secretary of said corporat and who are personally known to be the persons who executed as such persons the within instrument of writing on behalf of said corporation, and such persons duly acknowledged the execution of the same to be the act and deed of said corporation.

In TEstimony Whereof, I have hereunto set my hand and affixed my notarial seal the day and yyear last above written.

Anne T. Mulry, Notary Public
Commssion expires March 30th,1921.

Filed the 7th day of Jan,1921 at 1.10 P.M
Lena O. Brown, Register of Deeds.

Anita Brown, Deputy

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Guardian's Deed

This Indenture, Made this 15th day of December,1920, between Maude S. Moore as Guardia of Louise Moore and Ralph Stephens Moore, both single and minors of Allen County, State, of Kans party of the first part, and Sarah L. Rowden formerly Sarah L. Moore of Allen County, State of Kansas party of the fiirst pax Second part.

Witnesseth, That the said party of the first part, by virtue of an Order of Sale made a issued by the Probate Court of Allen County, State of Kansas, and dated the 22nd day of September 1920 has sold to the said party of the second part the real property hereinafter described, in co formity to law and to said Order of Sale, for the sum of Three Hundred Twelve and 50/100 Dollars, which sum is more than three fourths of the appraised value of said real property, and said Court has duly approved and confirmed said sale, and ordered the said party of the first part to make a deed for said premises so sold to the said purchaser.

Now, Therefore, In consideration of the sum of Three Hundred Twelve & 50/100 Dollars an by virtue of the powers in him vested by law and the aforesaid orders of said Court, the said par of the first part, as Guardian as aforesaid, does hereby grant, bargain, sell and convey, unto th said party of the second part, her heirs and assigns, forever, all the right, title and interest the said Louise Moore and Ralph Stephens Moore in and to all of the following described real prop erty, situated in Allen County, State of Kansas, to-wit, All their undivided one-sixteenth (1/16 of lot Four (4) Block One Hundred Seventeen (117) city of Iola, Kansas, also, All their undivided one-eighth (1/8) of lot one (1) Block One Hundred Seventeen (117) City of Iola, Kansas, all according to the recorded plat thereof.

To Have and To Hold the above granted premises, together with the appurtenances, unto t said partyof the second part, her heirs and assigns, forever.

In Witness Whereof, The said party of the first part has hereunto set her hand, the day and year first above written.

Maude S. Moore,
Guardian of Louise Moore and Ralph Stephens Mo minors.

State of Kansas, Allen County, ss

Be it remembered, That onthis 15th day of December,1920, before me, the undersigned, a Notary Public in and for said County and State, cameMaude S. Moore, Guardian of Louise Moore an RAlph Stephens Moore, both single and minors who is peronally known to me to be the same person who executed the foregoing deed, and duly acknowledged the execution of the same.

In TEstimony Whereof, I have hereunto subscribed my name and affixed my official seal, the day and year last above written.

J.B.Smith, Probate Judge.

State of Kansas,
Allen County, ss In The Probate court of said County.

Be it remembered, That on this 15th day of December,1920, the witbin and fore going DeeD was returned to this Court, and in open Court the sale of the premises therein describ and the said Deed were approved and confirmed by the Court.

In Testimony Whereof, I have hereunto subscribed my name and affixed the seal of said Court on the day and year last above written.

J.B.Smith, Probate Judge.

Filed the 7th day of Jan. 1921 at 3 P.M
Lena O. BRown, Register of Deeds

DOCUMENT INFO

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Filename: 1922-12 PWSP Withdrawal from Kansas.pdf

DOCUMENT INFO

APPLICATION OF FOREIGN CORPORATION TO WITHDRAW FROM THE STATE

TO THE CHARTER BOARD:

Comes now the PRIME WESTERN SPELTER COMPANY

a foreign corporation, duly organized under and by virtue of the laws of the state of Missouri and on the 10th day of November 1904, duly authorized and admitted to do business as a foreign corporation in the state of Kansas, and applies to the Charter Board of the State of Kansas for an order permitting said corporation to withdraw from the state of Kansas and declaring the license of such foreign corporation to be revoked, and shows to the Charter Board that on the 25th day of October, 1922, it caused to be published in The Iola Daily Register, a newspaper published and of general circulation within the county of Allen, State of Kansas, in which county is situated the principal place of business of said corporation within the state of Kansas, and which paper has been continuously published for more than fifty-two weeks prior to the first publication, notice of its intention to withdraw from the state of Kansas, and that said notice was published in said paper each week for four consecutive weeks, the last publication being November 22nd, 1922.

Affidavit making proof of publication is hereto attached and made a part of this application.

Said corporation further shows that Baxter D. McClain is the ~~managing officer~~ agent (of the corporation within the state); that all the debts and liabilities of the corporation within the state of Kansas have been discharged.

Wherefore, said corporation prays that the Charter Board, after inquiry duly made, order and declare the license of the applying corporation to be revoked.

[signature]
~~President or~~ Vice President.

Albert B. Schultz
Secretary ~~or General Manager of such Corporation.~~

OFFICE OF SECRETARY OF STATE.

Received of Prime Western Spelter Company

Two and 50/100 DOLLARS,

fee for withdrawal of said foreign corporation.

Dated this 28th day of Dec. 1922. ~~191~~

D. O. McCray
Secretary of State.

By P. M. Sessions
Chief Clerk.

6-6558

Richard Hopkins
Sec'y

Entered by the Court, Board this
day of

EPA7-002069

State of Kansas, ALLEN **County, ss.**

In the matter of the application of PRIME WESTERN SPELTER COMPANY,

Corporation, to the Charter Board of the State of Kansas for an order to withdraw and to revoke the license of such corporation.

PRIME WESTERN SPELTER COMPANY, ~~is a corporation duly organized under the laws of the State of~~ Missouri, and duly admitted to the State of Kansas and authorized to do business in said state. That I am the managing officer (or agent) of said corporation within the State of Kansas; that I am personally familiar and acquainted with the business of said corporation within the State of Kansas, and that all debts and liabilities of the corporation within the State of Kansas have been discharged, fully settled, and there are no debts or liabilities of any kind in the State of Kansas existing against said corporation.

Baxter D. McClain

Subscribed and sworn to before me this 6th day of December, 1922.

Lela F. Kennedy
Notary Public.

My commission expires Jan. 14-1923

6-6557

AFFIDAVIT OF PUBLICATION

STATE OF KANSAS, ALLEN COUNTY, SS.

Laura Suttman of lawful age, being first duly sworn, deposeth and saith, that She is Bookkeeper of THE IOLA DAILY REGISTER, a daily newspaper, published in the City of Iola, County of Allen, State of Kansas, and of general circulation in said county, and which said newspaper has been continuously and uninterruptedly published in said county during the period of one year immediately prior to the first publication of the notice hereto attached, and that a notice, of which a true copy is hereto attached, was published in the regular and entire issue of each number of said newspaper for 4 consecutive weeks; the first publication being made as aforesaid on the 25 day of October, 1922.

And affiant further says that She has personal knowledge of the statements above set forth and that they are true.

Laura Suttman

Subscribed and sworn to before me this 24th day of November A. D., 1922.

Eunice E. Jackson Notary Public.

My commission expires Nov. 24, 1924

Printer's Fee, $6

Received payment of J. R. Enfield

IOLA DAILY REGISTER,

By Laura Suttman

(First published in The Iola Daily Register, Oct. 25, 1922.)

NOTICE OF WITHDRAWAL.

Notice is hereby given that Prime Western Spelter Company, a corporation of ~~Missouri~~, heretofore doing business in Kansas, with an office at Iola, intends to withdraw from the State of Kansas on or before December 31, 1922, or as soon thereafter as the Charter Board shall order.

PRIME WESTERN SPELTER COMPANY.

DOCUMENT INFO

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Filename: 1924 Moodys NJZ.pdf

DOCUMENT INFO

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MOODY'S ANALYSES OF INVESTMENTS AND SECURITY RATING BOOKS

JOHN MOODY

INDUSTRIAL SECURITIES

MAURICE N. BLAKEMORE, - *Managing Editor*

Editorial Board:

JOHN SHERMAN PORTER — PAUL CLAY
DR. MAX WINKLER — WINTHROP C. SWAIN
W. BARRETT BROWN

FIFTEENTH YEAR

1924

MOODY'S INVESTORS SERVICE
35 NASSAU STREET, NEW YORK

PHILADELPHIA: 1224 Real Estate Trust Bldg.
BOSTON: 141 Milk Street
CHICAGO: 809 First Nat. Bank Bldg.
LOS ANGELES 613 Pacific Mutual Bldg.

London: FREDC. C. MATHIESON & SONS, 16 Copthall Ave., E. C. 2.
Zurich: A. BRUECHER, Tuggenerstrasse 14.

EPA7-002072

Comparative Income Account, Years Ended Dec. 31

	1922	1921	1920	1919	191
Gross revenue	$961,757	$1,030,352	$847,701	$838,584	$562,1
Operating expenses and taxes	739,116	777,814	651,541	666,907	377,7
Depreciation	39,421	58,898	58,559	49,023	48,5
Net operating revenue	$183,220	$194,141	$137,619	$122,654	$125,8
Other income	16,759	9,669	10,763	15,615	10,2
Total revenue	$199,979	$203,810	$148,373	$138,269	$136,0
Charges, etc.	113,364	149,309	82,133	97,244	76,3
Net income	$86,615	$54,501	$66,240	$42,025	$59,6
Preferred dividends	31,010	31,010	31,010	31,010	31,0
Common dividend	54,730	36,080	36,080	45,109	45,1
Surplus	$875	(d)$12,589	(d)$850	(d)$34,095	(d)$16,5

Comparative Balance Sheet, as of Dec. 31

Assets:	1922	1921	1920
Plant and equipment	$772,374	$851,009	$1,083,2
Patents	29,500	40,000	1,0
Investments	3,350	1,253	2,0
Inventories	213,946	232,563	244,9
Cash	38,764	11,360	15,2
Bills and accounts receivable	47,663	35,602	29,7
Deferred charges	2,503	4,029	1,5
Organization expenses	27,900	27,900	.....
Total	$1,136,010	$1,208,154	$1,378,0
Liabilities:			
Preferred stock	$443,000	$443,000	$443,0
Common stock	500,000	451,000	451,0
Current liabilities	42,826	20,377 }	102,7
Other liabilities	50,000	121,000 }	.....
Reserves	28,876	36,876	236,1
Surplus	71,306	114,901	85,2
Total	$1,136,010	$1,208,154	$1,378,0

Table B.—Stock Records and Ratings (Based on Five Year Income Results, Etc.)

Name of Issue	Rate of Dividend	Amount Outstanding	Average Income Available	Dividend Requirement	Factor of Safety	Equity	Suitability	Ra
1. Newaygo Portland Cement Co. 7% cum. pfd.	7% Qu. Mr.	$443,000	$61,861	$31,010	50%	$128.96	Fair	Ba
2. Newaygo Portland Cement Co. common	Not fixed	500,000	30,851	50,000*		14.26	*	Ba

1. Newaygo Portland Cement Co. 7% cum. preferred: Authorized, $443,000 (issued as 100% dividend common in June, 1917); par $100. No bonded debt. Dividends regularly paid quarterly, March, etc.

2. Newaygo Portland Cement Co. common: Authorized, $500,000; par $100. There is a prior issue of cumulative preferred. Common dividends paid as follows: 1911, 6%; 1912, none; 1913, 8%; 1914, 12%; 1915, 9%; 1916, 15%; 1917, 16%; 1918, 10%; 1919, 10%; 1920 and 1921, 8% per annum; March, 1922, 2%; Sept., 1922, 2%; Dec., 1922, 10%, of which, $49,000 was in stock and $44,443 in cash. Extra dividends of 3% paid in 1915 and 20% in 1916. Preferred stock (No. 1 above) issued as a 100% dividend in June, 1917. Dividends payable quarterly, March, etc.

* To pay 10% per annum

THE NEW JERSEY ZINC COMPANY

History: Incorporated Oct. 30, 1880, in New Jersey, as the New Jersey Zinc & Iron Co. Name changed to present title and capital increased from $2,000,000 to $10,000,000 in 1897, to $35,000,000 in 1915 and to $50,000,000 in 1920. Mines located at Franklin Furnace, N. J. Manufactures zinc oxide, spelter, spiegeleisen, lithopone, sulphuric acid, rolled zinc strips and plates, zinc dust and zinc chloride, with a smelting capacity of about 100,000 net tons of spelter per annum.

Subsidiaries: Company owns the stock of the Empire Zinc Co., New Jersey Zinc Co. (of Pa.) operating plant at Palmerton, Pa., and Freemansburg, Pa.; Chestnut Ridge Ry. Co.; the Mineral Point Zinc Co., Prince Western Spelter Co., The Tulsa Fuel & Manufacturing Co., and The Bertha Mineral Co.

Management: Officers: Edgar Palmer, Pres.; A. P. Cobb, Vice-Pres.; J. E. Hayes, Vice-Pres.; A. B. Schmidt, Sec.; H. S. Wardner, Treas.; G. F. Wolff, Compt.; E. V. Peters, Gen. Sales Mgr.; H. Hardenbergh, Gen'l. Fur. Agt., New York. Directors: W. P. Hardenbergh, August Heckscher, T. D. Jones, Edgar Palmer, Edwin M. Squier, John J. Ri[ker], C. W. Cox, Walter Douglas, Wm. Woodward. Annual Meeting: Last Wednesday in February, at Newark, N. J. Office: Newark, N. J. New York Office: 160 Front St.

EPA7-002073

Comparative Income Account, Years Ended Dec. 31

	1922	1921	1920	1919	1918	1917
Net earnings (after deprec)	$0,333,804	$2,339,888	$8,388,863	$10,648,095	$18,926,969	$25,412,705
Bond interest	160,000	160,000	160,000	160,000	160,000	160,000
Reserve to retire bonds	.....	.....	225,000	300,000	300,000	300,000
Reserve for Federal taxes	285,000	.....	400,000	1,235,000	7,162,677	9,797,753
Balance	$5,888,804	$2,179,888	$7,583,863	$8,948,095	$11,304,292	$15,154,952
Dividends	4,768,152	3,567,984	5,600,000	7,000,000	7,000,000	12,600,000
Bonus to employees	360,000	.....	.....	368,000	350,000	450,000
Net Surplus	$760,652	(d)$1,388,146	$1,083,863	$1,580,095	$3,954,292	$2,104,952
Earned on stock	12.21%	4.79%	18.06%	25.57%	32.30%	48.30%

Table A.—Bond Records and Ratings (Based on Five Year Income Results, Etc.)

Name of Issue	Interest Payable	Maturity	Authorized	Outstanding	Average Income Available	Interest Required Per Annum	Factor of Safety	Security	Salability	Rating
New Jersey Zinc Co. 1st 4s	A&O	O. 1926	$10,000,000	$4,000,000	$9,322,514	$160,000	98%	High	High	Aaa

The New Jersey Zinc Co. first gold 4s: Dated Oct. 1, 1901, due Oct. 1, 1926. Interest paid A. & O. 1 at company's office, 160 Front St., New York. Coupon, $1,000; registerable as to principal. Farmers Loan & Trust Co., New York, Trustee. Secured upon all the real estate of the company, and all of its mines, minerals, mining rights, buildings, machinery, fixtures, franchises, good will now owned or hereafter acquired, and all of the capital stock now owned in the New Jersey Zinc Co. (of Pa.), the Mineral Point Zinc Co., and the Empire Zinc Co., and all the capital stock of any other corporation or corporations which may hereafter be purchased by the company. Original authorized, $10,000,000, of which $4,000,000 were issued, the balance to be issued only for the purchase of new property including the capital stock of new corporations, or for the construction of new plants to be erected upon property owned by the company, or upon property owned by corporations the capital stock of which is owned by the New Jersey Zinc Co., and pledged under its mortgage. Of the $6,000,000 of unissued bonds, $4,200,000 had been retired up to Jan. 1, 1923, making the present authorized amount $5,800,000. The mortgage provides for the cancellation of $200,000 of unissued bonds yearly on Oct. 1, beginning 1902, the authorized amount of bonds to be reduced accordingly, and after all of such unissued bonds have been cancelled the company is required to pay to the trustee annually on Oct. 1, $200,000 as a sinking fund for the purchase or redemption of outstanding bonds at not exceeding par and interest. Bonds are subject to redemption for the sinking fund at par and interest on any interest date on four weeks' notice. So long as the company shall make no default in the payment of interest or principal of the bonds, it may sell and convey free, and discharge from the lien, any of the mortgaged property, rights, etc., and any of the capital stock of other corporations owned by it and pledged under the mortgage, the moneys received by the company in this way to be applied to the payment of the actual cost of new construction or for the acquisition of new property. All moneys not so applied, and which shall have remained in the trustee's hands for one year, shall be transferred to the sinking fund and applied to the purchase of outstanding bonds at not exceeding par and interest. Company pays normal income tax.

Table B.—Stock Records and Ratings (Based on Five Year Income Results, Etc.)

Name of Issue	Rate of Dividend	Amount Outstanding	Average Income Available	Dividend Requirement	Factor of Safety	Equity	Salability	Rating
New Jersey Zinc Co. stock	8% Qu. F.	$48,235,300	$7,180,978	$3,858,824		Note	Good	A

Note: Equity cannot be shown, as no balance sheet is available.

The New Jersey Zinc Co. stock: Authorized, $50,000,000 (increased from $35,000,000 in May, 1920); par $100. Regular dividends at rate of 20% per annum on $10,000,000 stock paid quarterly, Feb. 10, 1907, to and including May, 1915; Aug., 1915, dividend on $35,000,000 stock reduced to 2½%; Nov., 1915, 2½%; Feb., 1916, rate increased to 3%, which rate paid quarterly to and including May, 1920; on $42,000,000 stock paid 4% each, Aug. and Nov., 1920; 1921 and 1922, 8% per annum; Feb., 1923, 2%. In addition extra dividends were paid as follows: Jan., 1907, 10%; Jan., 1909, 5%; Jan., 1910 and 1911, 10% each; Jan., July and Dec., 1912, 10% each; Jan., July and Oct., 1913, 10% each; Jan. and July, 1914, 10% each; Oct. and Dec., 1914, 5% each; Jan., 1915, 10%; July, 1915, 30%; Oct., 1915, 2%; 1916, 60%; 1917, 80%; 1918 and 1919, 4% each; Jan., 1923, 2%. A stock dividend of 20% was paid in June, 1920.

Registrar: Farmers Loan & Trust Co., New York. Stock transferred at company's office. Quoted in New York Curb Market.

NEWMARKET MANUFACTURING COMPANY

History: Incorporated May 28, 1910, in Massachusetts; successor to a company of the same name incorporated in 1823 under special act of legislature of New Hampshire. Manufactures cotton and silk goods. Company has 7 mills at Newmarket, N. H., with an equipment of 65,000 spindles and 2,000 looms. Capacity, 6,000,000 yards of silk goods and 6,000,000 lbs. of cotton goods annually. Selling Agents: Samuel Eiseman & Co., New York, silk goods; Henry Searing, New York, cotton goods.

Management: OFFICERS: Dudley L. Pickman, Pres.; Chas Walcott, Treas.; Chas. C. Ryder, Clerk, Boston, Mass. DIRECTORS: D. L. Pickman, Boston; W. Almy, R. B. Almy, Brookline, Mass.; Chas. Walcott, M. Weston, Cambridge, Mass.; J. E. Osborn, Fall River, Mass.; F. E. Dunbar, Lowell, Mass.; A. C. Griffith, New York. ANNUAL MEETING: In February. GENERAL OFFICE: 87 Milk Street, Boston, Mass.

EPA7-002074

DOCUMENT INFO

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Filename: 1924-06-05 Dissolution.pdf

DOCUMENT INFO

Edgar Palmer
(President XXXXXXX) of the

Prime Western Spelter Company
(Give number and name of Corporation)

No. 10275

being duly sworn, upon his oath, states that said corporation was on the 19th day of March 19 24, by a unanimous vote of its stockholders, duly dissolved and is no longer in existence. This affiant further makes oath that on the above date he was the duly elected, authorized and acting President (President ~~Secretary~~) of the above named corporation, and that he makes this affidavit upon the authority, and pursuant to the instructions, of all the stockholders of the above named corporation as appears on page 11 of the minutes of the stockholders' meeting authorizing the filing of this affidavit; that all the debts, claims and bills of said corporation have been paid and full settlement made thereof.

Edgar T. Palmer
(President ~~Secretary~~)

Subscribed and sworn to before me, a Notary Public within and for the State & County of New York, this 22nd day of May 19 24.

Witness my hand and notarial seal the day and date last above written. My term expires the 30th day of March, 19 25.

Anne J. Mulry, Notary Public.

NOTARY PUBLIC,
NEW YORK COUNTY No. 261
NEW YORK REGISTER No. 9069
COMMISSION EXPIRES MARCH 30, 1925

NOTE—This affidavit, when filed in the office of the Secretary of State, together with the fee of $5.00, will legally dissolve a corporation in compliance with section 2996, R. S. Mo. 1909, as amended 1919.

EPA7-002075

No. 10275

(See top of your certificate for No.)

CORPORATE NAME:

RINE WESTERN

SMELTER COMPANY

Affidavit of Dissolution

Domestic Corporation.

FILED

JUN 5 1924

Charles A. Beckwith

SECRETARY OF STATE

DOCUMENT INFO

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Filename: Copy of 1925 Moodys NJ Zinc Officers.pdf

DOCUMENT INFO

ceived from sale of land thereby reducing sinking fund to 70% of land sales, and provision permitting the trustee to reject offers of bonds for sinking fund purchase, on the ground that the price is in excess of the market value. Authorized, $16,500,000, of which $10,044,800 outstanding as of Dec. 31, 1924; $4,500,000 held by Trustee; $129,500 in treasury; $1,118,800 cancelled and $706,900 unissued. Secured by deed of trust covering all property. Listed on San Francisco Stock & Bond Exchange and Los Angeles Stock Exchange. Company pays normal income tax of 2%.

Capital Stock: 1. Natomas Co. of Cal. 6% non-cum. preferred: Authorized, $7,250,000; outstanding, $6,823,200; par $100. Has preference as to assets and dividends. No dividends paid to April, 1925. Rating, *Ca*

2. Natomas Co. of Cal. common: Authorized, $9,250,000; outstanding, $9,249,500; par $100. No dividends paid to April, 1925. Rating, *Da*

Preferred listed on San Francisco Stock & Bond Exchange.

THE NEW JERSEY ZINC COMPANY

History: Incorporated Oct. 30, 1880, in New Jersey, as The New Jersey Zinc & Iron Co. Name changed to present title and capital increased from $3,000,000 to $10,000,000 in 1897, to $35,000,000 in 1915 and to $50,000,000 in 1920. Mines located at Franklin and Ogdensburg, N. J. Manufactures zinc oxide, slab zinc, spiegeleisen, lithopone, sulphuric acid, rolled zinc strips and plates, zinc dust, zinc chloride, salt cake, barium carbonate, sodium sulphide, black ash, metallic cadmium and zinc sulphide, with a smelting capacity of about 100,000 net tons of slab zinc per annum. The company acquired the Durex Chemical Co. in 1923.

Subsidiaries: Company owns the stock of the Empire Zinc Co., New Jersey Zinc Co. (of Pa.) operating plants at Palmerton, Pa., and Freemansburg, Pa.; Chestnut Ridge Ry. Co.; The Mineral Point Zinc Co., The Tulsa Fuel & Manufacturing Co., and The Bertha Mineral Co.

Management: OFFICERS: Edgar Palmer, Pres.; A. P. Cobb, Vice-Pres.; J. E. Hayes, Vice-Pres.; A. B. Schultz, Sec.; H. S. Wardner, Treas.; G. F. Wolff, Comp.; E. V. Peters, Gen. Sales Mgr.; W. J. Lee, Gen'l Pur. Agt., New York. DIRECTORS: W. P. Hardenbergh, J. E. Hayes, T. D. Jones, Edgar Palmer, Edwin M. Squier, John J. Riker, C. W. Cox, Walter Douglas, Wm. Woodward. ANNUAL MEETING: Last Wednesday in February, at Newark, N. J. MAIN OFFICE: Newark, N. J. NEW YORK OFFICE: 160 Front St.

Comparative Income Account, Years Ended Dec. 31

	1924	1923	1922	1921	1920	1919
Net earn. (after dep. & taxes)	$6,565,643	$6,524,404	$6,180,263	$2,339,838	$7,968,863	$9,408,095
Fixed charges	160,000	160,000	160,000	160,000	160,000	160,000
Reserve to retire bonds	.....	.....	.....	.....	225,000	300,000
Balance	$6,405,643	$6,364,404	$6,020,263	$2,179,838	$7,583,863	$8,948,095
Dividends	4,906,160	4,883,234	4,768,152	3,567,984	5,600,000	7,000,000
Bonus to employees	340,000	360,000	360,000	.....	.....	368,000
Surplus	$1,159,483	$1,121,170	$892,111	(d) $1,388,146	$1,983,863	$1,580,095
Earned on stock	13.05%	12.99%	12.48%	4.79%	18.06%	25.57%

Table A.—Bond Records and Ratings (Based on Five Year Income Results, Etc.)

NAME OF ISSUE	Interest Payable	Maturity	Authorized	Outstanding	Average Income Available	Interest Required Per Annum	Factor of Safety	Security	Salability	Rating
1. New Jersey Zinc Co. 1st 4s...	A&O	O. 1926	See text	$4,000,000	$5,915,802	$160,000	97%	High	High	Note

NOTE: Bonds not rated as no balance sheet is furnished.

1. The New Jersey Zinc Co. first gold 4s: Dated Oct. 1, 1901, due Oct. 1, 1926. Interest paid A. & O. 1 at company's office, 160 Front St., New York. Coupon, $1,000; registerable as to principal. Farmers Loan & Trust Co., New York, Trustee. Secured upon all the real estate of the company, and all of its mines, minerals, mining rights, buildings, machinery, fixtures, franchises, good will now owned or hereafter acquired, and all of the capital stock now owned in the New Jersey Zinc Co. (of Pa.), the Mineral Point Zinc Co., and the Empire Zinc Co., and all the capital stock of any other corporation or corporations which may hereafter be purchased by the company. Original authorized, $10,000,000, of which $4,000,000 were issued, the balance to be issued only for the purchase of new property, including the capital stock of new corporations, or for the construction of new plants to be erected upon property owned by the company, or upon property owned by corporations the capital stock of which is owned by the New Jersey Zinc Co. and pledged under its mortgage. Originally authorized, $10,000,000; outstanding, $4,000,000; of the $6,000,000 of unissued bonds, $4,600,000 had been cancelled to Jan. 1, 1925, making the present authorized amount $5,400,000. The mortgage provides for the cancellation of $200,000 of unissued bonds yearly on Oct. 1, beginning 1902, the authorized amount of bonds to be reduced accordingly, and after all of such unissued bonds have been cancelled the company is required to pay to the trustee annually on Oct. 1, $200,000 as a sinking fund for the purchase or redemption of outstanding bonds at not exceeding par and interest. Bonds are subject to redemption for the sinking fund at par and interest on any interest date on four weeks' notice. So long as the company shall make no default in the payment of interest or principal of the bonds, it may sell and convey free, and discharge from the lien, any of the mortgaged property, rights, etc., and any and all of the capital stock of other corporations owned by it and pledged under the mortgage, the moneys received by the company in this way to be applied to the payment of the actual cost of new construction or for the acquisition of new property. All moneys not so applied, and which shall have remained in the trustee's hands for one year, shall be transferred to the sinking fund and applied to the purchase of outstanding bonds at not exceeding par and interest. Company pays normal income tax of 2%.

Table B.—Stock Records and Ratings (Based on Five Year Income Results, Etc.)

NAME OF ISSUE	Rate of Dividend	Amount Outstanding	Average Income	Dividend Requirement	Factor of Safety	Equity in Surplus	Salability	Rating
1. New Jersey Zinc Co stock.. . .	8% Qu. J.	$49,081,600	$5,710,802	$3,926,528		Note	Good	Note

NOTE: Equity cannot be shown nor stock rated as no balance sheet is furnished. For stock description see next page.

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1. The New Jersey Zinc Co. stock: Authorized, $50,000,000 (increased from $35,000,000 in May, 1920); par $100. Regular dividends at rate of 20% per annum on $10,000,000 stock paid quarterly, Feb. 10, 1907, to and including May, 1915; Aug., 1915, dividend on $35,000,000 stock reduced to 2½%; Nov., 1915, 2½%; Feb., 1916, rate increased to 4%, which rate paid quarterly to and including May, 1920; on $42,000,000 stock paid 4% each, Aug. and Nov., 1920; 1921 to May, 1925, incl., 8% per annum. In addition, paid extras as follows: Jan., 1907, 10%; Jan., 1909, 5%; Jan., 1910 and 1911, 10% each; Jan., July and Dec., 1912, 10% each; Jan., July and Oct., 1913, 10% each; Jan. and July, 1914, 10% each; Oct. and Dec., 1914, 5% each, Jan., 1915, 10%; July, 1915, 30%; Oct., 1915, 2%; 1916, 60%; 1917, 30%; 1918 and 1919, 4% each; 1923, 4%; 1924, 2%. Paid stock dividends of 250%, July 7, 1917 and 20% June 10, 1920. Dividends payable quarterly, Feb. 10, etc., to stock of record about Jan. 31, etc.

Registrar: Farmers Loan & Trust Co., New York. Stock transferred at company's office. Quoted in New York Curb Market.

NEWPORT NEWS SHIPBUILDING & DRY DOCK COMPANY

History: Incorporated January 26, 1886, in Virginia, as the Chesapeake Dry Dock and Construction Co.; name changed to present title on February 17, 1890. Company has a large plant at Newport News, Va., comprising over 140 acres of land, with a water frontage of 5,800 feet, three dry docks and the necessary buildings and machinery for the construction and repair of all classes of vessels; building and repair of freight cars and locomotives also building of hydraulic turbines of the largest class. Company had contracts in March, 1925, for 4 freight and passenger steamers. In Dec., 1923, company acquired the turbine business of the Wellman-Seaver-Morgan Co.

Management: OFFICERS: H. E. Huntington, Chm. of Board, San Gabriel, Cal.; H. L. Ferguson, Pres. and Gen. Mgr., Newport News, Va.; F. P. Palen, Vice-Pres., New York; S. L. Wood, Vice-Pres., Newport News, Va.; C. E. Graham, Treas.; E. A. Adams, Sec. and Asst. Treas., New York; James Plummer, Asst. Sec., New York; G. A. Parker, Asst. Sec., Newport News, Va. DIRECTORS: H. E. Huntington, San Gabriel, Cal.; A. C. Rearick, F. P. Palen, E. A. Adams, New York; H. L. Ferguson, C. F. Bailey, S. L. Wood, Newport News, Va. ANNUAL MEETING: Second Thursday in March, at Newport News, Va. NEW YORK OFFICE: 233 Broadway.

Comparative Condensed Balance Sheet, as of Dec. 31

ASSETS:	1924	1923	LIABILITIES:	1924	1923
Cost of property, etc.....	$26,149,601	$25,856,321	Capital stock	$10,000,000	$10,000,000
Materials and supplies.....	*1,482,545*	*1,519,954*	Bonded debt	13,600,000	13,600,000
Bills and accounts receivable	*1,695,111*	*351,172*	*Interest, etc. due and accd.*.	*407,200*	*374,000*
Due on contracts.....	*7,670,105*	*7,700,200*	*Bills and accounts payable*.	*746,360*	*334,543*
Cash	*3,515,548*	*829,691*	*Contracts*	*4,826,000*	*5,651,641*
Other assets	6,469,584	5,094,374	Suspense	292,303	1,197,201
			Other liabilities	5,394,583	3,298,763
			Reserves	8,854,119	5,251,976
			Profit and loss.....	2,861,929	1,643,588
Total	$46,982,494	$41,351,712	Total	$46,982,494	$41,351,712

NOTE: Items shown above in italics represent details of working capital summarized as follows:

Working Capital: *1923, current assets, $10,401,017; current liabilities $6,360,184; net current assets, $4,040,833. 1924, current assets, $14,363,309; current liabilities, $5,979,560; net current assets, 8,383,749.*

Bonded Debt: 1. Newport News Shipbuilding & Dry Dock Co. first gold 6s: Authorized, $30,000,000; outstanding, $13,600,000. Dated Jan. 16, 1922; due January 15, 1972. Interest paid J&J 15, at company's office, New York. Equitable Trust Company, New York, Trustee. Coupon, $1,000; registerable as to principal. Secured by first mortgage on shipyard property. Issued to retire $600,000 Chesapeake Dry Dock & Construction Co. first 5s of 1937; $2,000,000 Newport News Shipbuilding & Dry Dock Co. first 5s of 1990; $5,000,000 Newport News Shipbuilding & Dry Dock Co. general 5s of 1953 and $6,000,000 5% cumulative preferred stock. Company pays normal tax of 2%.

Capital Stock: 1. Newport News Shipbuilding & Dry Dock Co. stock: Authorized, $20,000,000; outstanding, $10,000,000 (increased from $2,000,000 in 1922); par $100. A prior issue of cumulative preferred was retired in 1922. Dividends of 15% paid in 1905; none thereafter until Jan. 10, 1919, when 5% was paid; Dec. 31, 1919, 50%; June 10 and Dec. 31, 1920, 50% each; none thereafter to April 15, 1925. Paid a stock dividend of 400% Oct. 17, 1922.

Stock transferred at company's office.

THE NEW YORK AIR BRAKE COMPANY

History: Incorporated under the laws of New Jersey, June 1, 1890. Perpetual charter. The properties owned and operated as follows: At Watertown, N. Y.: (a) Beebe's Island property, comprising about 4.54 acres, equipped with 23 buildings with a total floor space of over 135,000 sq. ft.; (b) East Plant, comprising about 66 acres, on which are erected eight iron and brass foundries, with a floor space of over 250,000 sq. ft., and a machine shop, completed in 1910, 200x360 feet in size; (c) real estate, other than factories, consisting of about 165 acres, suitable for factory or dwelling purposes, adjacent to the East Plant. The plants have a daily capacity of about 1,000 sets of car brakes. In April, 1902, a plant was placed in operation near Moscow, Russia, costing nearly $1,500,000. In April, 1910, the company sold this plant and its gas engine business at that point to the International Harvester Co. for $2,250,000. It, however, retained all of its patents on brakes and its rights to do business in Russia. During 1912 company entered into an agreement with the Westinghouse Air Brake Co. whereby the New York Air Brake Co. is licensed to manufacture under Westinghouse patents all parts of their equipment.

Management: OFFICERS: C. A. Starbuck, Pres; E. K. Conneely, R. B. Sheridan, Vice-Pres.; E. A. Johnson, Asst. Treas.; A. V. Smith, Asst. Sec.; C. B. Lecser, Compt. DIRECTORS: F. S. Flower, B. J. Minnier, Watertown, N. Y.; C. A. Starbuck, J. W. Cutler, A. V. Stout, R. B. Sheridan, Le Roy W. Baldwin, J. H. Carter, Samuel McRoberts, New York. ANNUAL MEETING: Second Wednesday in March at Jersey City, N. J. MAIN OFFICE: 165 Broadway, New York. CHICAGO OFFICE: Peoples Gas Building.

MONTHLY BUSINESS BAROMETER Moody's Investment Letters keep investors posted upon the trend of the security markets for the major moves, as well as upon fundamental conditions in the business and financial world. These Letters are the guide upon which an ever increasing number of bankers and business men depend for an interpretation of economic trends. We should be pleased to send copies upon request.

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MINERAL RESOURCES

OF THE

UNITED STATES

1914

H. D. McCASKEY
Geologist in Charge, Division of Mineral Resources

PART I—METALS

H. D. McCASKEY, Geologist in Charge

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GOVERNMENT PRINTING OFFICE
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ZINC SMELTERS.

The following table gives the zinc-smelting capacity of the United States on December 31, 1914, and June 30, 1915, as well as the retorts under construction or contemplated during the latter half of 1915. Those plants which have an "A" in the column headed "Acid plant" operate sulphuric-acid plants, either at the smelter or elsewhere, as indicated in the footnotes.

Active zinc smelters in the United States, showing capacity in 1914 and 1915, by companies and States.

[Includes plants working on ore alone, on ore and drosses, and on drosses alone.]

State.	Operating company.	Location.	Acid plant.	Retorts at close of 1914.	Retorts June 30, 1915.	Additional retorts contemplated or under construction.
Colorado	United States Zinc Co.	Pueblo		1,920	2,240	320
Illinois	American Zinc Co. of Illinois.	Hillsboro	A	4,000	4,000	
Do.	Collinsville Zinc Smelting Co.	Collinsville		[a] 1,536	1,536	
Do.	Granby Mining & Smelting Co.	East St. Louis	A		1,620	1,620
Do.	Hegeler Zinc Co.	Danville	A	1,800	3,600	
Do.	Illinois Zinc Co.	Peru	A	4,640	4,640	
Do.	Matthiessen & Hegeler Zinc Co.	La Salle	A	5,256	6,156	
Do.	Missouri Zinc Co.	Beckemeyer		192	192	160
Do.	Mineral Point Zinc Co.	Depue	[b] A	9,060	9,060	
Do.	National Zinc Co.	Springfield	[c] A	3,200	3,200	
Do.	Robert Lanyon Zinc & Acid Co.	Hillsboro	A	1,840	1,840	800
Do.	Sandoval Zinc Co.	Sandoval		996		900
				32,540	35,884	3,480
Kansas	American Zinc, Lead & Smelting Co.	Caney		[d] 3,648	4,596	1,524
Do.	do.	Dearing		[d] 3,840	4,480	
Do.	Chanute Spelter Co.	Chanute		[a] 1,280	1,280	
Do.	Cherokee Smelting Co.	Bruce			896	
Do.	Edgar Zinc Co.	Cherryvale		4,800	4,800	
Do.	Granby Mining & Smelting Co.	Neodesha		3,760	3,760	
Do.	Joplin Ore & Spelter Co.	Pittsburgh			1,120	224
Do.	Pittsburg Zinc Co.	do.		[a] 910	896	448
Do.	Prime Western Spelter Co.	Gas	[e] A	4,768	4,768	
Do.	United States Smelting Co.	Altoona		[d] 2,960	3,960	660
Do.	do.	Iola			1,400	2,040
Do.	do.	La Harpe		1,856		1,924
				28,822	32,056	6,820
Missouri	Edgar Zinc Co.	St. Louis		1,100	2,000	
Do.	Nevada Smelting Co.	Nevada				672
Oklahoma	Bartlesville Zinc Co.	Bartlesville		5,184	5,184	
Do.	do.	Collinsville		3,064	3,064	2,016
Do.	Kusa Spelter Co.	Kusa				3,300
Do.	Lanyon-Starr Smelting Co.	Bartlesville		3,456	3,456	
Do.	National Zinc Co.	do.		4,260	4,970	
Do.	Tulsa Fuel & Manufacturing Co.	Collinsville		6,232	6,232	
Do.	United States Zinc Co.	Sand Springs		2,400	4,800	1,800
				29,596	32,706	6,916

[a] Idle in 1914.
[b] The Mineral Point Zinc Co. also operates an acid plant at Mineral Point, Wis.
[c] The National Zinc Co. has zinc-roasting furnaces at Argentine, Kans., where the sulphur gases are utilized in an acid plant, the roasted concentrates being shipped to the smelter at Springfield, Ill.
[d] Practically idle in 1914.
[e] The Prime Western Spelter Co. has roasting furnaces and an acid plant at Tiltonville, Ohio.

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Active zinc smelters in the United States, showing capacity in 1914 and 1915, by companies and States—Continued.

State.	Operating company.	Location.	Acid plant.	Retorts at close of 1914.	Retorts June 30, 1915.	Additional retorts contemplated or under construction.
Pennsylvania	American Steel & Wire Co.	Donora	A	.....	.....	9,600
Do	American Zinc & Chemical Co.	Langeloth	A	880	3,648	3,648
Do	New Jersey Zinc Co. (of Pennsylvania).	Palmerton	.....	5,760	6,720	.....
				6,640	10,368	13,248
West Virginia	Clarksburg Zinc Co.	Clarksburg	.....	1,824	2,736	912
Do	Grasselli Chemical Co.	do	[a]A	5,760	5,760	.....
Do	do	Meadowbrook	A	6,912	6,912	1,680
				14,496	15,408	2,592
Total for all States				115,114	130,642	34,048
	Plants with special retorts: [b]					
	Michael Hayman & Co.	Buffalo, N. Y.	.....	12	12	.....
	Trenton Smelting & Refining Co.	Trenton, N. J.	.....	40	80	.....
	William Cramp & Sons Ship & Engine Building Co.	Philadelphia, Pa.	.....	24	32	.....

[a] The Grasselli Chemical Co. operates acid plants in connection with its zinc-roasting furnaces at Grasselli, Ind., Cleveland, Canton, and Lockland (near Cincinnati), Ohio, and Newcastle, Pa., the roasted zinc concentrates being shipped to the smelters at Clarksburg and Meadowbrook, W. Va.
[b] Large graphite retorts yielding 600–800 pounds of spelter per charge.

In the foregoing list there are a few smelters which treat only secondary materials, such as zinc ashes, skimmings, and galvanizers' drosses. There are also a few which recover about equal quantities of spelter from ores and from secondary materials, as well as several more which treat minor quantities of secondary materials. There are several other zinc-smelting plants in the country which obtain spelter by distillation of zinc ashes and drosses in large graphite crucibles and condensers somewhat similar to those used in the Faber du Faur furnaces for recovering zinc from the zinc crusts in lead desilverization. These are given at the bottom of the list.

TOTAL SMELTER CAPACITY.

From the 115,114 retorts listed above as in existence at the close of 1914, there should be deducted 20,646 retorts at plants either idle during the year or just completed at the close of the year or engaged in smelting secondary material, which leaves 94,468 retorts as effective for ore at the close of the year. Owing to the low price of spelter which prevailed during the first half of 1914, many plants must have been at part capacity, and the erratic course of the spelter market during the last half of the year must have deterred most of these from speeding up production, so that it was not until well into 1915 that the American spelter industry got into its full stride.

As the total number of retorts was 115,114 at the close of 1914 and 130,642 at the close of June, 1915, there was an increase of 16,728

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retorts, or 14 per cent, over the smelting capacity in 1914. The whole number of retorts in operation in June was about 129,000. Since June, 1915, 34,048 retorts have been completed or are under construction or in contemplation. If all these are constructed together with the 3,300 additional at the Kusa smelter, the zinc-smelting capacity of the country will be increased more than 40 per cent over 1914. It seems likely, however, in view of the recent decline in prices of spelter and the large increase in capacity already available that some of the contemplated additions will not be made.

AVERAGE SPELTER CAPACITY PER RETORT.

In 1908 the United States Geological Survey instituted an inquiry to determine the smelting capacity per retort. The result of this inquiry gave 4½ short tons of spelter as the maximum output per retort with steady operation.

The zinc content of ore smelted ranges from about 20 per cent in some Leadville carbonates to 60 per cent in Joplin blende. The spelter yield per retort does not vary exactly with the zinc content of the charge, for the smelting loss is more or less constant for each charge. Hence, two charges of 30 per cent zinc ore will show double the loss of a charge of 60 per cent ore, or probably more than double, on account of the extra foreign material in the charge.

During the period 1906–1908 about 62 per cent of the spelter smelted in the United States was produced from Joplin high-grade ores. In the last few years only about 40 per cent of the total has been smelted from Joplin ores, and owing to this more extensive use of lower-grade ores the capacity per retort must tend to be somewhat lower than in 1908. Again, owing to the large probable production for the current year, the high-grade Joplin ores will constitute a still smaller proportion of the total than heretofore; hence the average output per retort will be lowered still further. Another fact that tends to reduce the average is that owing to the unprecedented difference in price between "prime western" and high-grade spelter, a considerable number of retorts are employed in redistilling "prime western" spelter to improve its grade, reducing by that much the capacity for smelting ore and hence the average output per retort. These facts are offset to a certain extent by the improvement in zinc recovery which must have taken place since 1908. It is plain, however, that a somewhat exaggerated notion of the possible output of spelter will result from multiplying the number of retorts by 4½ tons.

For several years the United States Geological Survey has been giving the total number of retorts in existence at the close of the year. From these are subtracted the retorts in idle smelters and the retorts engaged in smelting skimmings and drosses, leaving the effective smelting capacity. The latter, however, may include an unknown number of idle retorts at smelters which are operating at partial capacity. It also counts as active through the year all retorts constructed during the year. Dividing the total quantity of spelter produced in 1910–1914 by the "effective" retorts for that period we have an output per retort of 3.5 tons. The actual capacity per retort can not be less than this, and must be more, owing, as pointed out above, to the

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inclusion of idle retorts at operating smelters and of new retorts operating only a portion of the year.

A canvass of the zinc smelters in December, 1913, showed 85,051 retorts in operation. Some retorts were added to those during the year, so that there were 94,468 retorts effective for ore at the close of 1914. If we assume that the addition of new retorts was distributed evenly we have 89,760 retorts as the estimated average number in operation through the year. Dividing the total spelter production, 353,049 tons, by 89,760, the average number of retorts in operation, we obtain 3.9 tons per retort as the average capacity, and this is almost the mean of the results, 4.25 and 3.5 reached above as extremes of retort capacity.

SMELTER CHANGES IN 1914.

There was not much change in the zinc-smelting capacity of the United States during 1914 as compared with 1913. Of two new plants, that of the American Zinc & Chemical Co., at Langeloth, Pa., was ready for operation, in part, with 880 retorts. The plant was designed to have 3,520 retorts when complete. The other new plant was that of the Tulsa Spelter Co., at Sand Springs, Okla., which completed 2,400 retorts by the close of the year, with 1,600 under construction. The Clarksburg Zinc Co., of West Virginia, reported 912 retorts less than in 1913, and the plant of the Nevada Zinc Co. was sold and dismantled. The Mineral Point Zinc Co. added 2,280 retorts, a total of 9,080, the largest retort capacity at any single plant in the country at the end of 1914. The American Zinc Co., of Illinois, added one block of 800 retorts at Hillsboro.

According to the Engineering and Mining Journal the Saeger retort charging machines are installed at the Bartlesville works of the National Zinc Co. These machines charge the retorts in one hour as against three hours required in hand charging, and charge more material per retort. The Simmonds retort-discharging machine was developed at La Harpe and has been used at Iola. Arrangements are now being made to install the machine at three smelters. It is reported to take less than one minute to discharge a vertical row of retorts. Most smelters with acid works use the Hegeler furnace, and most of those not making acid use some form of the long mechanically raked roasters.. The Grasselli Chemical Co. has recently adopted the Spirlet, one of the newer forms of multiple hearth furnaces now popular abroad. It is said to be very economical of fuel.

SMELTER CHANGES IN 1915.

The following notes from the midyear spelter statement issued August 26, 1915, are repeated here as a matter of record in this time of rapid change in the industry:

As was natural under the circumstances, there was much activity in smelter building during the first half of the year, with further increases under construction or planned for the immediate future.

In Pennsylvania the American Zinc & Chemical Co. completed the new plant at Langeloth as planned, with 3,648 retorts, and immediately began construction to exactly double the capacity for both spelter and sulphuric acid. The New Jersey Zinc Co. added about 960 retorts at the Palmerton plant. The American Steel &

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Wire Co. began the construction of a large plant at Donora, about 25 miles south of Pittsburgh, on Monongahela River. The plant will contain 9,600 retorts, with a planned capacity of 40,000 tons a year of spelter and the equivalent quantity of acid. It is expected that a portion of the plant will be ready for operation at the beginning of 1916. In West Virginia both the Grasselli Chemical Co. and the Clarksburg Zinc Co. made additions.

In Illinois the Granby Mining & Smelting Co. completed the plant at East St. Louis, with 1,620 retorts and an acid plant. An addition which will double the capacity is building. The Hegeler Zinc Co. constructed 1,800 additional retorts at Danville, doubling the capacity of both the smelting plant and the acid plant. The Matthiesen & Hegeler Zinc Co. added 912 retorts at La Salle, and the Robert Lanyon Zinc & Acid Co. will add 800 retorts at Hillsboro. The plant of the Sandoval Zinc Co. was destroyed by fire early in the year, but has been rebuilt and is now being operated with about 900 retorts.

In Missouri the Edgar Zinc Co. is operating 2,000 retorts, against 1,100 at the close of 1914. The old smelter at Nevada was dismantled at the beginning of the year, but is being reconstructed and will start with 672 retorts.

In Kansas the J. B. Kirk Gas & Smelting Co. rebuilt several blocks of the old Lanyon smelter at Iola and operated it until June 30, when it was purchased by the United States Smelting Co., which also purchased, on June 15, the plant of the Altoona Zinc Smelting Co. A new smelter constructed on the site of the old plant of the La Harpe Spelter Co. by the Nicholson Construction Co. was likewise purchased by the United States Smelting Co. Additional retorts are under construction at all three plants, and, when completed, will increase the smelting capacity by 6,000 retorts over that at the beginning of the year. At Caney the American Zinc, Lead & Smelting Co. is operating 948 additional retorts and has 1,524 under construction, which will be completed in September. At Dearing the same company has added 640 retorts. The Cherokee Zinc Co. reopened the old smelter at Bruce, with 896 retorts, and it was purchased in July by the Cherokee Smelting Co. The Pittsburgh Zinc Co. is building 448 additional retorts. The Joplin Ore & Spelter Co. purchased the old Cockerill smelter at Pittsburg, rebuilt the furnaces, and replaced the hand roasters by two mechanical roasters. The plant of the Chanute Zinc Co. was taken over by the Chanute Spelter Co.

In Oklahoma the Bartlesville Zinc Co. is adding 2,016 retorts at Collinsville. The National Zinc Co. added 710 retorts at Bartlesville, and the United States Zinc Co. added 2,400 retorts at Sand Springs and is building 1,600 more. The Kusa Spelter Co. is building a smelter at Kusa, a new town in a gas and coal belt about 5 miles east of Henryetta. Five blocks of 660 retorts each are under active construction, and the company expects to have 1,980 retorts in operation in September and 1,320 more in October. It is probable that on the completion of the plant work will immediately be begun on another unit of the same capacity.

In Colorado the United States Zinc Co. added 320 retorts to the plant near Pueblo and is building 320 additional retorts.

SMELTERS IN GREAT BRITAIN.

The following list of active smelters in Great Britain has been checked and brought up to date by a correspondent of the United States Geological Survey.[1] Like the list of zinc smelters in the United States it includes all plants producing spelter by distillation or electrolysis, whether from ore or ashes and drosses. A large number of smelters which recover spelter from secondary materials by remelting, "sweating," or other ways, is not included.

[1] It is included here because of the wide interest in information regarding zinc-smelting capacity.

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GEORGE OTIS SMITH, Director

MINERAL RESOURCES

OF THE

UNITED STATES

1915

H. D. McCASKEY
Geologist in Charge, Division of Mineral Resources

PART I—METALS

H. D. McCASKEY, Geologist in Charge

WASHINGTON
GOVERNMENT PRINTING OFFICE
1917

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electrolytic spelter. The zinc lost in redistillation is not all irretrievably lost, however, for most of it goes into the leady residues, which will probably be sold to lead desilverizers, who can afford to pay for the zinc content.

ZINC-REDUCTION PLANTS.

ELECTROLYTIC ZINC PLANTS.

Electrolytic zinc plants.

Company.	Location of plant.	Daily spelter capacity.	Remarks.
American Smelting & Refining Co.	Omaha, Nebr.	Experimental.	Operated in 1915.
Do.	Murray, Utah.	Experimental.	
Anaconda Copper Mining Co.	Anaconda, Mont.	25 tons.	Under construction: 10 tons operated in 1915.
Do.	Great Falls, Mont.	100 tons.	Under construction.
Bully Hill Copper Co.	Bully Hill, Cal.	Experimental.	Operated in 1915.
		10 tons.	Under construction.
Colorado Metal Mining & Reduction Co.	Georgetown, Colo.	Ore capacity, 100 tons.	Malm process; under construction.
Electrolytic Zinc Co.	Baltimore, Md.	10 tons.	Under construction in 1915; now in operation.
Judge Mining and Smelting Co.	Park City, Utah.	15 tons.	Under construction.
Mammoth Copper Mining Co.	Kennett, Cal.	Experimental.	Operated in 1915.
		25 tons.	Under construction.
Northwestern Metals Co.	Helena, Mont.	Ore capacity, 100 tons.	Malm process; completed 1914; never operated.
Reed Zinc Co.	Palo Alto, Cal.	Experimental.	Operated in 1914–15.
River Smelting & Refining Co.	Keokuk, Iowa.	do.	Operated in 1915.

Several experimental electrolytic zinc plants were in operation in 1915, and the Anaconda Copper Co. completed a 10-ton commercial plant and began operating it near the close of the year. The total output of electrolytic spelter for the year was 252 tons. Several other plants of commercial size were completed during the first six months of 1916 and the output for the half year was 1,697 tons primary spelter. A considerable quantity of spelter was electrolytically refined from spelter of ordinary grade and from zinc ashes and skimmings. Both the Anaconda plants, with an aggregate capacity of 125 tons daily, will be in full operation before the close of 1916, and the output of electrolytic spelter should make a good gain during the last half of the year.

ZINC SMELTERS.

The following table gives the zinc-smelting capacity of the United States on December 31, 1915, and June 30, 1916, as well as the retorts under construction or contemplated during the latter half of 1916. Those plants which have an "A" in the column headed "Acid plant" operate sulphuric-acid plants, either at the smelter or elsewhere, as indicated in the footnotes.

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Active zinc smelters in the United States and capacity in 1915 and 1916.

[Includes plants working on ore alone, on ore and drosses, and on drosses alone.]

State.	Operating company.	Location.	Acid plant.	Retorts at close of 1915.	Retorts June 30, 1916.	Additional retorts contemplated or under construction.
Arkansas	Fort Smith Spelter Co	Fort Smith			2,560	
Do	Arkansas Zinc & Smelting Corporation.	Van Buren			2,400	
					4,960	
Colorado	United States Zinc Co	Pueblo		2,208	1,944	
Illinois	American Zinc Co. of Illinois	Hillsboro	A	4,000	4,864	
Do	Collinsville Zinc Smelter	Collinsville		1,792	2,304	
Do	Granby Mining & Smelting Co	East St. Louis	A	3,220	3,220	2,400
Do	Hegeler Zinc Co	Danville	A	3,600	5,400	
Do	Illinois Zinc Co	Peru	A	4,640	4,640	800
Do	Matthiessen & Hegeler Zinc Co	La Salle	A	6,168	6,168	
Do	Missouri Zinc Co	Beckemeyer		352	352	
Do	Mineral Point Zinc Co.[a]	Depue	A	9,068	9,068	
Do	National Zinc Co.[b]	Springfield	A	3,200	4,480	
Do	Robert Lanyon Zinc & Acid Co	Hillsboro	A	1,840	3,200	
Do	Sandoval Zinc Co	Sandoval		672	672	
				38,552	44,368	3,200
Kansas	American Spelter Co	Pittsburg		896	992	
Do	American Zinc, Lead & Smelting Co.	Caney		6,080	6,080	
Do	do	Dearing		4,480	4,480	
Do	Chanute Spelter Co	Chanute		1,280	1,280	
Do	Cherokee Smelting Co	Bruce		896	896	
Do	Edgar Zinc Co	Cherryvale		4,800	4,800	
Do	Granby Mining & Smelting Co	Neodesha		3,760	3,760	
Do	Iola Zinc Co	Concreto		960	1,320	
Do	Joplin Ore & Spelter Corporation	Pittsburg		1,444	1,792	
Do	Lanyon Smelting Co	do		448	448	
Do	Owen Zinc Co	Caney		1,280	1,280	640
Do	Pittsburg Zinc Co	Pittsburg		910	910	
Do	Prime Western Spelter Co.[c]	Gas	A	4,368	4,368	
Do	United States Smelting Co	Altoona		3,960	4,800	
Do	do	Iola		3,440	3,440	
Do	do	La Harpe		1,924	1,924	
Do	Weir Smelting Co	Weir				448
				41,126	42,870	1,088
Missouri	Edgar Zinc Co	St. Louis		2,000	2,000	
Do	Missouri Zinc Smelting Co	Rich Hill			448	
Do	Nevada Smelting Co	Nevada		672	672	
				2,672	3,120	
Oklahoma	Bartlesville Zinc Co	Bartlesville		5,184	6,336	
Do	do	Blackwell			1,600	4,800
Do	do	Collinsville		10,752	12,440	
Do	Bartlesville Zinc Co. (Lanyon-Starr plant).	Bartlesville		3,456	3,456	
Do	Eagle-Picher Lead Co	Henryetta				4,000
Do	Henryetta Spelter Co	do			3,000	
Do	J. B. Kirk Gas & Smelting Co	Checotah			2,568	2,568
Do	Kusa Spelter Co	Kusa		3,720	3,720	
Do	La Harpe Spelter Co	do			4,000	
Do	National Zinc Co	Bartlesville		4,970	4,970	
Do	Oklahoma Spelter Co	Kusa			1,600	
Do	Quinton Spelter Co	Quinton				1,340
Do	Tulsa Fuel & Manufacturing Co	Collinsville		6,232	6,232	
Do	United States Zinc Co	Sand Springs		5,680	8,000	
				39,994	58,914	12,700

[a] The Mineral Point Zinc Co. also operates an acid plant at Mineral Point, Wis.
[b] The National Zinc Co. has zinc-roasting furnaces at Argentine, Kans., where the sulphur gases are utilized in an acid plant, the roasted concentrates being shipped to the smelter at Springfield, Ill.
[c] The Prime Western Spelter Co. has roasting furnaces and an acid plant at Tiltonville, Ohio.

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Active zinc smelters in the United States and capacity in 1915 and 1916—Continued.

State.	Operating company.	Location.	Acid plant.	Retorts at close of 1915.	Retorts June 30, 1916.	Additional retorts contemplated or under construction.
Pennsylvania	American Zinc & Chemical Co.	Langeloth	A	3,648	6,384	912
Do	Donora Zinc Co., operated by the American Steel & Wire Co.	Donora	A	3,648	9,120	.....
Do	New Jersey Zinc Co. (of Pennsylvania).	Palmerton	.....	6,720	6,960	.....
				14,016	22,464	912
West Virginia	Clarksburg Zinc Co.	Clarksburg	.....	3,648	3,648	.....
Do	Grasselli Chemical Co.[a]	....do	A	5,760	5,760	.....
Do	....do	Meadowbrook	A	8,592	8,592	.....
Do	United Zinc Smelting Corporation	Moundsville	A	.....	.....	6,912
				18,000	18,000	6,912
Total for all States			.....	156,568	196,640	24,312
	Plants with special retorts:[b]					
	Eastern Zinc Refining Co.	Brooklyn, N. Y.	.....	.....	.....	8
	Michael Hayman & Co.	Buffalo, N. Y.	.....	12	12	.....
	M. Mocahowitz & Son Metal Co.	Trenton, N. J.	.....	15	15	.....
	Trenton Smelting and Refining Co.	....do	.....	96	60	.....
	William Cramp & Sons Ship & Engine Building Co.	Philadelphia, Pa	.....	32	32	.....

[a] The Grasselli Chemical Co. operates acid plants in connection with its zinc-roasting furnaces at Grasselli, Ind., Cleveland, Canton, and Lockland (near Cincinnati), Ohio, and Newcastle, Pa., the roasted zinc concentrates being shipped to the smelters at Clarksburg and Meadowbrook, W. Va.

[b] Large graphite retorts yielding 600–800 pounds of spelter per charge.

In the foregoing list there are a few retort smelters which treat only secondary materials, such as zinc ashes, skimmings, and galvanizers' drosses. There are also a few which recover about equal quantities of spelter from ores and from secondary materials, as well as several more which treat minor quantities of secondary materials. There are several other zinc-smelting plants in the country which obtain spelter by distillation of zinc ashes and drosses in large graphite crucibles and condensers somewhat similar to those used in the Faber du Faur furnaces for recovering zinc from the zinc crusts in lead desilverization. These are given at the bottom of the list.

INCREASE IN SMELTING CAPACITY.

Increase in 1915.—The number of retorts at the beginning of 1915 was 113,914, at the midyear it was 130,642, and at the end 156,568, an increase of nearly 40 per cent in capacity for the year. All available retorts were in active operation and new retorts were put into commission as fast as completed. The large quantity of the higher grades of spelter made by redistillation from the ordinary grades necessitated a greatly enlarged retort capacity, so that the actual output of spelter in itself gives no reliable clue to the number of retorts in use. This Survey has no information of the total number of retorts engaged in redistillation, and hence can not make the usual estimate of the number of retorts effective for smelting ore.

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Increase in 1916.—The number of retorts at zinc smelters at the close of 1915 was 156,568, and there were building or planned 49,612 additional retorts, a total of 206,270. The number at smelters June 30, 1916, was 196,640, and 24,812 additional retorts were building or planned, a total of 221,452.

The decline in the price of spelter during May, June, and July caused the temporary closing of some of the smaller smelters and the reduction of operations by several others. A canvass by the Survey showed not over 180,417 retorts in active operation August 15, 1916, out of a possible 199,328. Some of them were being used to treat secondary materials, such as zinc ashes and drosses, and an unknown number of others were engaged in refining the ordinary grade of spelter by redistillation. It will be noted that the number of retorts on August 15 was somewhat larger than that on June 30, owing to the completion of some of those under construction at the earlier date.

TOTAL SMELTER CAPACITY.

On the basis that 156,568 retorts were already in existence at the beginning of 1916, that the 49,612 additional retorts then planned and the electrolytic plants aggregating 60,000 tons in annual capacity, also then planned, were completed, and that the smelters of secondary spelter kept their usual capacity, the United States, as was estimated in the spelter statement of April 4, would have the capacity at the close of 1916 to produce spelter at the rate of more than 900,000 tons a year. This estimate was plainly stated to be one of the capacity under normal or average conditions at the close of the year—in other words, it pertained to capacity which might be exercised during 1917—and it was in no sense an estimate of output for either 1916 or 1917.

It need have occasioned no surprise that the production during the first half of 1916 failed to equal half the capacity indicated for 1917 in the Survey's estimate of capacity. There are evident reasons, of course, why it could not. During the half-year (1916) 25 per cent of the retorts on which the estimate of capacity was based were only under construction or planned; in fact, one-sixth of the 25 per cent had not been completed at the close of the half-year. These could not contribute to the output. Also a very considerable number of retorts was engaged in redistilling spelter of ordinary grade to make it of high grade and so were not operating under normal or usual conditions. These retorts not only did not add to the output of spelter, but they diminished it, because there was a loss of 7 to 10 per cent of zinc in the redistillation. Allowance was made for these factors in the estimate of capacity because it was there considered that the capacity for high-grade electrolytic spelter at the close of 1916 plus the output of high-grade spelter from the lead-free ores of the Eastern States would relieve these retorts of such redistilling.

The average capacity per retort, estimated by the Survey at 4 tons, was somewhat fully considered on pages 892–893 of the chapter on zinc in Mineral Resources, 1914, to which the reader is referred for the data on which the estimate is based. By reason of great demands and high prices it has been claimed that the retorts were so crowded that the ores were "butchered." This, if true, would reduce the percentage of recovery but not the output. Smelters would certainly not crowd the retorts if they would thereby lower

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the average total output per retort. In times of great demand it would be expected, rather, that percentage of recovery might be sacrificed to capacity.

It does not seem likely that the grade of ore smelted in 1915 and 1916 was materially lower than in previous years. Practically all zinc sulphide ores are concentrated before being smelted. If the average grade of zinc concentrates was in fact lower it would, of course, lower the average capacity per retort. But zinc smelters, forced by the lack of smelting capacity in 1915, paid a premium for higher-grade concentrates and refused to buy the lower grade. It is improbable that the grade of concentrates from Franklin Furnace or from the East Tennessee zinc mines during 1915–16 was lower. The grade of the small output of Wisconsin carbonates in 1915 was 2½ points lower than in 1914, and that of the green sulphide concentrates was 1½ points higher, but sphalerite concentrates from Wisconsin are mostly re-treated by roasting and magnetic separation, and the average grade as delivered to the smelter is not definitely known, but was higher than in 1914, because a larger part of the ore was roasted and magnetically concentrated before being smelted. In the Joplin district as a whole the average grade of sphalerite concentrates was 0.6 of a point higher, and the grade of carbonates and silicates more than 0.9 of a point higher in 1915 than in1914. The following quotation from J. P. Dunlop,[1] of this Survey, referring to conditions in the Joplin district, is of interest:

> The significant feature of the ore market during the year was the wide margin between the base prices offered for the high and for the medium and lower grades of concentrates. The spread had usually been comparatively small, but in 1915 it was generally $10 to $15 a ton and ferquently the difference was as great as $15 or $20 a ton. This was due to the imperative demand by the smelters for concentrates free from lead or containing less than 1 per cent lead. Some weeks it was difficult to sell the low-grade ore even at the quoted low base price.

Zinc sulphide concentrates from the Butte & Superior mill assayed half a point higher in 1915 than in 1914. The increase of flotation treatment during 1915 must have operated to raise the grade of zinc sulphide concentrates in other Western States. In fact, so far as domestic zinc concentrates are concerned, the grade must have been raised instead of lowered in 1915. But large quantities of zinc concentrates from Australia have been received and treated in 1915–16. If these were sufficiently below the average grade of domestic concentrates to overcome the increase in grade of domestic concentrates, then the average grade of all concentrates may have been lowered. W. R. Ingalls[2] says 848,776 tons of sulphide concentrates and 349,299 tons of carbonate concentrates were smelted in the United States in 1915. Assuming 40 per cent as the average zinc content of the carbonates, 58 per cent as the zinc content of the Joplin sulphides, and 50 per cent as the average zinc content of all other sulphides, we get an average zinc content of 49 per cent for all zinc ores smelted. Ingalls estimates it at 50 per cent. As the Australian concentrates have for several years averaged a little over 47 per cent, and as probably the higher grade concentrates only were brought to the United States in 1915, it does not appear that the Australian imports have materially lowered the general grade of concentrates smelted.

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[1] Dunlop, J. P., U. S. Geol. Survey Mineral Resources, 1915, vol. 1, p. 89, 1916.
[2] Ingalls, W. R., Spelter statistics for 1915: Eng. and Min. Jour., vol. 101, p. 607, 1916.

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SMELTER CHANGES IN 1915.

In Pennsylvania the American Zinc & Chemical Co. completed the new plant at Langeloth as planned, with 3,648 retorts, and immediately began construction exactly to double the capacity for both spelter and sulphuric acid. The New Jersey Zinc Co. added 960 retorts at the Palmerton plant. The Donora Zinc Co. began the construction of a large plant at Donora, on the Monongahela River, about 25 miles south of Pittsburgh. The plant will contain 9,600 retorts, with a planned capacity of 40,000 tons a year of spelter and the equivalent quantity of acid. There were 3,648 retorts completed and operating by the close of 1915. The plant was put in partial operation in 104 days from the start of construction, a record in zinc smelter building.

In West Virginia the Clarksburg Zinc Co. doubled its capacity by adding 1,824 retorts. The Grasselli Chemical Co. added 1,680 retorts at Meadowbrook.

In Illinois the Granby Mining & Smelting Co. completed a smelter with 3,220 retorts and commensurate acid department at Rose Lake, a short distance from East St. Louis. The Hegeler Zinc Co., at Danville, doubled smelting and acid capacity from 1,800 to 3,600 retorts. The Matthiesson & Hegeler Zinc Co. added 912 retorts at La Salle. The plant of the Sandoval Zinc Co., at Sandoval, was burned during the year, but rebuilt in time to start before the close of the year.

In Missouri the old coal-fired smelter at Nevada was dismantled early in the year, but was later rebuilt and operated by the Nevada Smelting Co.

In Kansas the J. B. Kirk Gas & Smelting Co. rebuilt several blocks of the old Lanyon smelter at Iola and operated it until June 30, when it was purchased by the United States Smelting Co., which had also purchased, on June 15, the plant of the Altoona Zinc Smelting Co. A new smelter constructed on the site of the old plant of the La Harpe Spelter Co. by the Nicholson Construction Co. was likewise purchased by the United States Smelting Co. Additional retorts were constructed at all three plants, which, at the close of the year, had over 9,000 retorts. The American Zinc, Lead & Smelting Co. added 640 retorts to the plant at Dearing and 2,432 retorts to the plant at Caney, where also the Owen Zinc Co. constructed a plant with 1,280 retorts, which was operated under lease by the American Zinc, Lead & Smelting Co. The Cherokee Zinc Co. reopened the old smelter at Bruce, with 896 retorts, and it was purchased in July by the Cherokee Smelting Co. The Pittsburg Zinc Co. built 448 additional retorts. The Joplin Ore & Spelter Corporation purchased the Cockerill smelter at Pittsburg, rebuilt the furnaces, and replaced the hand roasters by two mechanical roasters. The American Spelter Co. built a plant with 992 retorts, also at Pittsburg, which with four smelters in operation, began to resemble the Pittsburg of the days before natural-gas smelting. The plant of the Chanute Zinc Co. was taken over by the Chanute Spelter Co. The Iola Zinc Co. built a block of 660 retorts at Concreto, 3 miles northeast of Gas.

In Oklahoma the Bartlesville Zinc Co. added 2,688 retorts at Collinsville, the National Zinc Co. added 710 retorts at Bartlesville,

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and the United States Zinc Co. added 3,280 retorts at Sand Springs. The Kusa Spelter Co. built a smelter with 3,720 retorts at Kusa, a new town in a gas and coal belt about 5 miles east of Henryetta.

SMELTER CHANGES IN 1916.

Some of the smelters listed as planned early in the year were abandoned, and other plants not listed never got beyond the promotion stage. On the other hand, work was begun on three smelters not listed. Extensive additions were made to plants already in existence. A few notes summarized from the mid-year spelter statement issued August 15, 1916, are given here to record the rapid changes in the industry.

In Pennsylvania the plant of the Donora Zinc Co. was completed and put into full operation. The plant of the American Zinc & Chemical Co. was increased to double its former capacity and a further addition of 912 retorts was begun.

In West Virginia the United Zinc Smelting Corporation, affiliated with the Clarksburg Zinc Co., broke ground at Moundsville in July for a smelter of 6,912 retorts and an acid plant.

In Illinois additional capacity was erected at Hillsboro (by the American Zinc Co. of Illinois and the Robert Lanyon Zinc & Acid Co.), at Collinsville, at Danville, and at Springfield. The Granby Mining & Smelting Co. began an addition of 2,400 retorts at East St. Louis.

In Missouri the old coal-fired smelter at Rich Hill was rebuilt by the Missouri Zinc Smelting Co.

In Kansas another block of 660 retorts was erected by the Iola Zinc Co. at Concreto. Additions were made by the Joplin Ore & Spelter Corporation at Pittsburg, by the Owen Zinc Co. at Caney, and by the United States Smelting Co. at Altoona. At Weir City, the site of the first zinc smelter west of St. Louis, the Weir Smelting Co. built a small coal-fired smelter.

In Oklahoma the Bartlesville Zinc Co. began the erection of a smelter at Blackwell, 1,600 retorts being completed by the middle of the year and 4,800 being under construction. At Henryetta, the Henryetta Spelter Co. completed a 3,000-retort smelter and the Eagle-Picher Lead Co. began the erection of a 4,000-retort plant. At Kusa, the Kusa Spelter Co. doubled its capacity by adding 3,720 retorts, the La Harpe Spelter Co. built a plant of 4,000 retorts, and the Oklahoma Spelter Co. built one of 1,600 retorts. The Quinton Spelter Co. began the erection of 1,340 retorts at Quinton, and the J. B. Kirk Gas & Smelting Co. built a plant with 2,560 retorts at Checotah. Under date of August 15, the United States Smelting Co. traded its plant at Iola, Kans., for the plant at Checotah, and began an addition to double its capacity. The United States Zinc Co. added 2,320 retorts at Sand Springs, and the Bartlesville Zinc Co. added 1,152 retorts at Bartlesville and 2,688 at Collinsville, making the latter by far the largest zinc smelter in the world.

In Arkansas the Fort Smith Spelter Co. built a smelter with 2,560 retorts at Fort Smith, and the Arkansas Zinc & Smelting Corporation erected a plant of 2,400 retorts at Van Buren. Both these plants draw natural gas from a pool in the vicinity of Fort Smith.

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The American Zinc, Lead & Smelting Co. took over the Granby Mining & Smelting Co., acquiring mining lands and a lead smelter in Missouri, a natural-gas zinc smelter at Neodesha, Kans., and the new smelter at East St. Louis. For the present, the corporate identity of the Granby Co. is preserved.

The Butte & Superior Mining Co. acquired an interest in the American Zinc, Lead & Smelting Co., and it is reported that plans for their consolidation are maturing.

TRADE CONDITIONS.

WORLD'S PRODUCTION.

Owing to the disturbed conditions in Europe, complete figures of the world's spelter production in 1914 and 1915 can not be given. In the table the fragmentary statistics for those years were obtained from consular reports, official reports, mining journals, or any other source available.

The following spelter statistics prior to 1914, apportioned according to the country where smelted and not according to the source of the ore, are the figures of Henry R. Merton & Co., of London, taken from the annual statistical publication for 1913 of the Metallgesellschaft, the Metallurgische Gesellschaft, A.-G., and the Berg und Metallbank Aktiengesellschaft of Frankfort on the Main, Germany, except that the figures for the United States are those of the United States Geological Survey:

World's production of spelter, 1907–1915, in short tons.

Country.	1907	1908	1909	1910	1911	1912	1913	1914	1915
Australia	1,098	1,198	.....	560	1,904	2,531	4,105	5,618	[a] 7,500
Austria	12,522	14,063	13,931	14,666	18,602	21,609	23,928	.....	.....
Belgium	170,307	181,851	184,194	190,233	215,060	220,678	217,998	.....	.....
France and Spain	61,438	61,512	61,859	65,191	70,791	79,543	78,289	[b] 12,944	[b] 8,497
Germany	230,059	239,092	242,594	251,046	276,008	298,794	312,075	.....	.....
Great Britain	61,286	60,029	65,422	69,531	73,806	83,086	85,197	.....	.....
Holland	16,528	19,107	21,548	23,121	25,059	26,380	26,811	18,098	12,243
Japan	.....	.....	.....	.....	.....	.....	.....	6,554	23,421
Norway	.....	.....	.....	.....	7,363	8,959	10,237	[c] 10,028	[c] 17,349
Russia	10,735	9,740	8,758	9,514	10,952	9,659	8,389	[a] 7,000	.....
United States	249,860	210,424	255,760	269,184	236,526	338,806	346,678	353,049	489,819
	813,830	796,896	854,066	823,046	986,061	1,070,048	1,096,695	.....	.....
United States percentage of world's production	30.7	26.4	29.9	30.1	29.1	31.7	31.7	.....	.....

[a] Estimated. [b] Spain only. [c] Sweden.

PRODUCTION OF SECONDARY SPELTER IN EUROPE.

The following table of the production of secondary spelter in Europe is calculated to short tons from a table published by Rudolf Wolff, Kreuger & Co., of London. It includes the ouptut of the larger regular producers only. The production of the United States is included for comparison.

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THE MINERAL INDUSTRY

ITS

STATISTICS, TECHNOLOGY AND TRADE

DURING

1915

FOUNDED BY RICHARD P. ROTHWELL

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ZINC

By R. L. Bartlett

The year of 1915 was one of unparalleled prosperity for the zinc-smelting and zinc-mining industries of the United States, the production eclipsing all previous records, and the prices during the year being such as to bring unexampled prosperity to zinc-mining and smelting districts. With the European production of spelter either stopped entirely, or at least kept from the open market, it was to America that the world turned for the spelter, not only to supply the normal demand, but to furnish the enormous quantities needed for war purposes. Zinc mining was greatly stimulated, and the supply of zinc ore throughout the year was far in excess of the capacity of the smelters. Therefore, the smelting companies were in a position to make most favorable terms for themselves with the ore producers, and while the price of ore reached previously unknown levels, it did not keep pace with the price of spelter, a very large margin of profit going to the smelting companies. Owing also to the insufficient facilities for smelting the ores offered by producers, and the perfectly natural desire on the part of the smelters to fill their retorts with high-grade ore, the producers of low-grade ores could not find so ready a market for their output.

During the year the zinc-smelting capacity of the United States was increased very largely, a great many new plants being erected, and old plants enlarged. The extraction of zinc by electrolytic methods received considerable attention, many experimental and small-sized plants adding materially to the spelter output of the country. The following table compiled by Mr. C. E. Siebenthal of the U. S. Geological Survey shows the location by States of the zinc smelters in the United States, and data as to the retorts used in 1915, and contemplated for 1916. The electrolytic zinc plants are also listed, as well as plants having special retorts.

Notes for table on page 711.

(a) The National Zinc Co. has zinc-roasting furnaces at Argentina, Kans., where the sulphur gases are utilized in an acid plant, the roasted concentrates being shipped to the smelter at Springfield, Ill.

(b) Completed in 1915, but not operated until 1916.

(c) Including furnaces of Owen Zinc Co., operated under lease.

(d) The Prime Western Spelter Co. has roasting furnaces and an acid plant at Tiltonville, Ohio.

(e) The Grasselli Chemical Co. operates acid plants in connection with its zinc-roasting furnaces at Grasselli, Ind., Cleveland, Canton, and Lockland (near Cincinnati), Ohio, and Newcastle, Pa., the roasted zinc concentrates being shipped to the smelters at Clarksburg and Meadowbrook, W. Va.

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LIST OF ACTIVE ZINC SMELTERS IN THE UNITED STATES, SHOWING CAPACITY IN 1915, BY COMPANIES AND STATES

[Includes plants working on ore alone, on ore and drosses, and on drosses alone]

Company and State.	Location.	Acid Plant.	Retorts at Close of 1915.	Retorts to be Added in 1916.
Arkansas:				
Fort Smith Spelter Co.	Fort Smith	.....	.....	2,560
Arkansas Zinc Co.	Van Buren?	.....	.....	2,400
Total		.....	.....	4,960
Colorado:				
United States Zinc Co.	Pueblo	.....	2,208	.....
Illinois:				
American Zinc Co. of Illinois	Hillsboro	A	4,000	800
Collinsville Zinc Smelter	Collinsville	.....	1,792	512
Granby Mining & Smelting Co.	East St. Louis	A	3,220	.....
Hegeler Zinc Co.	Danville	A	3,600	1,800
Illinois Zinc Co.	Peru	A	4,640	800
Matthiessen & Hegeler Zinc Co.	La Salle	A	6,168	.....
Missouri Zinc Co.	Beckemeyer	.....	352	.....
Mineral Point Zinc Co.	Depue	A	9,068	.....
National Zinc Co.	Springfield	A (a)	3,200	640
Robert Lanyon Zinc & Acid Co.	Hillsboro	A	1,840	800
Sandoval Zinc Co.	Sandoval	.....	672	.....
Total		.....	38,552	5,352
Kansas:				
American Spelter Co. (b)	Pittsburg	.....	896	.....
American Zinc, Lead & Smelting Co.	Caney	.....	(c) 7,360	.....
American Zinc, Lead & Smelting Co.	Dearing	.....	4,480	.....
Chanute Spelter Co.	Chanute	.....	1,280	.....
Cherokee Smelting Co.	Bruce	.....	896	.....
Edgar Zinc Co.	Cherryvale	.....	4,800	.....
Granby Mining & Smelting Co.	Neodesha	.....	3,760	.....
Iola Zinc Co.	Concreto	.....	660	.....
Joplin Ore & Spelter Co.	Pittsburg	.....	1,444	.....
Pittsburg Zinc Co.	Pittsburg	.....	1,358	.....
Prime Western Spelter Co.	Gas	A (d)	4,868	.....
United States Smelting Co.	Altoona	.....	3,960	.....
United States Smelting Co.	Iola	.....	3,440	.....
United States Smelting Co.	La Harpe	.....	1,924	.....
Total		.....	41,126	.....
Missouri:				
Edgar Zinc Co.	St. Louis	.....	2,000	.....
Nevada Zinc Co.	Nevada	.....	672	.....
Rich Hill Zinc Co.	Rich Hill	.....	.....	448
Total		.....	2,672	448
Oklahoma:				
Bartlesville Zinc Co.	Bartlesville	.....	5,184	.....
Bartlesville Zinc Co.	Blackwell	.....	.....	4,800
Bartlesville Zinc Co.	Collinsville	.....	10,752	672
Henryetta Spelter Co.	Henryetta	.....	.....	1,800
J. E. Hildt	Tulsa	.....	.....	3,660
J. B. Kirk Gas & Smelting Co.	Checotah	.....	.....	3,200
Kusa Spelter Co.	Kusa	.....	3,720	.....
La Harpe Spelter Co.	Kusa	.....	.....	4,000
Lanyon-Starr Smelting Co.	Bartlesville	.....	3,456	.....
National Zinc Co.	Bartlesville	.....	4,970	.....
Oklahoma Spelter Co.	Kusa	.....	.....	1,600
Picher Lead Co.	Henryetta	.....	.....	3,200
Tulsa Fuel & Manufacturing Co.	Collinsville	.....	6,232	.....
United States Zinc Co.	Sand Springs	.....	5,080	800
United States Smelting Co.	Blackwell	.....	.....	6,000
Total		.....	39,994	29,732
Pennsylvania:				
American Steel & Wire Co.	Donora	A	3,648	5,472
American Zinc & Chemical Co.	Langeloth	A	3,648	3,648
New Jersey Zinc Co. (of Pennsylvania)	Palmerton	.....	6,720	.....
Total		.....	14,016	9,120
West Virginia:				
Clarksburg Zinc Co.	Clarksburg	.....	3,648	.....
Grasselli Chemical Co.	Clarksburg	A (e)	5,760	.....
Grasselli Chemical Co.	Meadowbrook	A (e)	8,592	.....
Total		.....	18,000	.....
Total for all States		.....	156,568	49,612

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PLANTS WITH SPECIAL RETORTS (a)

Company.	Location.	Retorts at Close of 1915.
Paul Grimm (Inc.)	Trenton, N. J.	9
Michael Hayman & Co.	Buffalo, N. Y.	12
Trenton Smelting & Refining Co.	Trenton, N. J.	96
William Cramp & Sons Ship & Engine Building Co.	Philadelphia, Pa.	32

(a) Large graphite retorts yielding 600–800 lb. of spelter per charge.

ELECTROLYTIC ZINC PLANTS

Company.	Location of Plant.	Daily Spelter Capacity.	Remarks.
American Smelting & Refining Co.	Omaha, Nebr	Experimental	Operated in 1915.
American Smelting & Refining Co.	Garfield, Utah	10 tons	Planned.
Anaconda Copper Mining Co.	Anaconda, Mont.	25 tons	Under construction; 10 tons operated in 1915.
Anaconda Copper Mining Co.	Great Falls, Mont.	100 tons	Under construction.
Bully Hill Copper Co.	Bully Hill, Cal.	Experimental 10 tons	Operated in 1915 Under construction.
Daly-Judge Mining Co.	Park City, Utah	15 tons	Under construction.
Electrolytic Zinc Co.	Baltimore, Md.	10 tons	Under construction; 2½ tons now in operation.
Mammoth Copper Mining Co.	Kennett, Cal.	Experimental	Operated in 1915.
Northwestern Metals Co.	Helena, Mont.	Ore capacity, 100 tons.	Malm process; not operated in 1915.
Reed Zinc Co.	Palo Alto, Cal.	Experimental	Operated in 1914–15.
River Smelting & Refining Co.	Keokuk, Iowa	Experimental	Operated in 1915.
Western Metals Co.	Georgetown, Colo.	Ore capacity, 100 tons.	Malm process; under construction.

Mr Siebenthal in commenting on the large increase in zinc-smelting capacity of United States, says:

"The number of retorts at zinc smelters has been greatly enlarged in the last year as compared with the year before, increasing from 111,458 at the end of 1913 to 115,114 at the close of 1914, to 130,642 at the middle of 1915, and to 156,658 at the close of 1915. At the beginning of 1916 there was under construction or contemplated additional capacity amounting to 26,992 retorts, which has now been increased to 49,612. When these are completed the total number of retorts will be 206,270, capable of an annual yield under average conditions of approximately 4 tons each, equal to a total of 825,000 tons, if we neglect the number of retorts employed in refining prime western spelter by re-distillation. To this capacity will be added the capacity of the electrolytic zinc plants listed above, over 60,000 tons a year, giving a capacity for the country of about 885,000 tons annually. As if this were not enough, there are reports of still other zinc smelters to be built in Illinois, Missouri, Arkansas, and Oklahoma.

"The abnormal demand for high-grade spelter at present has resulted in the employment of a considerable proportion of the retort capacity of the country in the re-distillation of prime western spelter to improve its grade, but with the resump-

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tion of normal conditions these retorts, if operated, will necessarily be put back upon ore. This prediction is rendered certain by the growth in number and size of the plants producing spelter by electrolytic deposition, a list of which is given above. Electrolytic spelter is of high grade, and the recovery is high compared with the production of high-grade spelter by two distillations. The output of electrolytic zinc in the United States in 1915, the initial year of its production, was only 252 tons, but the production is rapidly increasing and by the end of 1916 will undoubtedly reach the rate of over 60,000 tons a year, which, with the output of high-grade spelter from lead-free zinc ores of the Eastern States will be ample to supply the demands for high-grade spelter in ordinary times, thus releasing for ore smelting the retorts engaged in re-distilling prime western spelter.

"At the close of 1916 the spelter-producing capacity of the country, taking into account the capacity for primary spelter listed above, the output of secondary spelter by the large special retorts, and the output of re-melted spelter, will apparently be considerably more than 900,000 tons, or nearly three times the probable domestic demands. The world's consumption of spelter in 1913 was 1,102,456 short tons. It requires no particular insight to recognize that the end of the war, except for a single contingency, will bring about the sudden extinction of a large number of the less advantageously situated smelters. That contingency, which would perhaps justify this abnormal smelting capacity, is the conclusion of arrangements by which in the future practically the whole of the Australian zinc output would be smelted in the United States. In such an event it would seem that smelters fired with producer gas and situated on the Atlantic seaboard, with adjacent markets for acid, would have the advantage over the inland smelters, which have to pay railroad transportation charges, even if such charges are partly offset by the saving involved in using natural gas for fuel."

Production and Consumption Statistics

The following tables, compiled by C. E. Siebenthal and published by the U. S. Geological Survey give the production of primary and secondary spelter in the United States, consumption of primary spelter in the United States, as well as exports and imports of zinc ores, and products containing zinc.

PRODUCTION OF SPELTER IN 1915
(In tons of 2000 lb.)

	1914.	1915.	Change in 1915. Quantity.	Per Cent.
Production of primary spelter[a] in United States.	353,049	489,519	136,470	39
Consumption of primary spelter in United States.	299,125	364,382	65,257	22
Value of primary spelter produced in United States	$36,011,000	[b]$121,401,000	$85,390,000	237

a Primary spelter is made directly from ore, but secondary spelter is recovered from such sources as drosses, skimmings, and old metals.
b Value calculated from average selling price.

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PRODUCTION OF PRIMARY SPELTER IN THE UNITED STATES

Apportioned according to source of ore

	1910.	1911.	1912.	1913.	1914.	1915.
United States:						
Total domestic	252,479	271,621	323,907	337,252	343,418	458,135
Foreign:						
Canada	3,304	1,598	4,199	1,424	4,538	5,103
Mexico	13,401	13,307	10,700	6,205	5,093	13,943
Europe	.....	.....	.....	1,175	.....	1,073
Asia	.....	.....	.....	620	.....	1,030
Australia	.....	.....	.....	.....	.....	10,235
Total foreign	16,705	14,905	14,899	9,424	9,631	31,384
Grand total	269,184	286,526	338,806	346,676	353,049	489,519

Apportioned according to locality in which smelted

Illinois	73,038	83,130	88,397	106,654	127,946	159,958
Kansas	105,697	98,413	101,104	74,106	44,510	100,983
Oklahoma	34,760	46,315	76,925	83,214	91,367	109,206
Other States	55,689	58,668	72,380	82,702	89,226	118,990
Total	269,184	286,526	338,806	346,676	353,049	489,519

PRODUCTION OF SECONDARY ZINC IN THE UNITED STATES

Secondary spelter, re-distilled	12,784	14,043	26,064	25,991	20,545	29,764
Secondary spelter, re-melted	28,439	26,470	26,187	24,014	22,424	c22,300
Recovered zinc in alloys, exluding old brass re-melted	2,709	3,223	3,912	3,743	3,914	c5,300

c Subject to final revision.

CONSUMPTION OF PRIMARY SPELTER IN THE UNITED STATES

Supply:						
Stock, Jan. 1—						
In bonded warehouses	39	31	32	48	.....	111
At smelters	11,167	23,201	9,049	4,474	40,659	19,984
Production—						
From domestic ore	252,479	271,621	323,907	337,252	343,418	458,135
From foreign ore	16,705	14,905	14,899	9,424	9,631	31,384
Imports	1,960	609	11,115	6,100	880	904
Total available	282,350	310,367	359,002	357,298	394,588	510,518
Withdrawn:						
Exports, foreign, from warehouse	4,758	11,276	6,286	6,027	5,580	13,720
Exports, foreign, under drawback	4,486	3,079	1,219	7,459	4,981	367
Exports, domestic	3,990	6,872	6,634	7,783	64,807	117,796
Stock, Dec. 31—						
In bonded warehouses	31	32	48	.....	111	32
At smelters	23,201	9,049	4,474	40,659	19,984	14,221
Total withdrawn	36,466	30,308	18,661	61,928	95,463	146,136
Apparent consumption	245,884	280,059	340,341	295,370	299,125	364,382

EXPORTS OF DOMESTIC ZINC ORE AND DROSS

Zinc ore	19,711	18,281	23,349	17,713	11,110	232
Zinc dross	4,729	4,246	205	28	2,526	4,167

IMPORTS OF ZINC ORE

Zinc ore	72,626	39,116	43,940	31,416	31,962	158,852
Zinc content	25,439	15,933	17,567	13,497	12,132	57,660

NOTE.—Imports and exports of spelter are given under the heading "Consumption." The imports of spelter in 1909–1915 are as given in the December Summary of the Bureau of Foreign and Domestic Commerce except that for 1909–1912, inclusive; the quantities given therein have been diminished by the quantity of zinc dust imported since Aug. 5, 1909, for the reason that the imports of spelter and zinc dust for that period were not separated in the Summary. The imports of spelter do not include sheet zinc, but include a few hundred tons of old zinc, fit only for re-manufacturing. The stock in bonded warehouses does not include zinc ore in bond or the spelter made therefrom, such spelter being included in stock at smelters.

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EXPORTS

Exports of lead and zinc from the United States by 6-month periods, 1914–1915, by classes, in pounds

	1914.				1915.			
	January–June.		July–December.		January–June.		July–December.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Domestic:								
Zinc ore	16,083,200	$375,184	6,137,600	$113,280	1,355,200	$24,791	309,120	$10,485
Spelter and sheets	1,659,558	100,557	127,954,164	8,440,011	128,735,815	11,627,295	106,856,700	17,618,699
Zinc dross	572,477	29,084	4,498,590	128,860	5,853,250	345,287	2,470,268	161,569
Zinc manufactures	.....	82,254	.....	128,654	.....	1,047,975	.....	1,125,114
Brass, old, for re-manufacturing	13,535,666	1,437,763	7,103,735	663,107	8,662,272	912,896	2,594,400	346,742
Brass, bars, plates, and sheets	3,084,933	443,187	4,030,869	455,966	36,251,304	5,683,217	30,020,806	6,752,689
Brass, articles made from	.....	1,862,515	.....	1,894,373	.....	10,924,990	.....	30,192,781
Cartridges	.....	1,896,415	.....	4,670,707	.....	13,043,498	.....	11,771,181
Lead, pigs and bars	40,323,662	1,511,800	77,120,238	2,989,874	115,903,983	4,936,730	58,280,194	2,860,268
Lead manufactures	.....	633,234	.....	885,000	.....	732,875	.....	1,538,022
Foreign:								
Zinc ore, contents	279,000	5,909	.....	.....	.....	.....	.....	.....
Zinc blocks, pigs, and old	55,118	2,534	10,825,453	209,602	11,408,033	336,399	16,032,910	2,110,571
Zinc dust	34,212	1,775	322,050	15,697	227,408	22,680	204,407	32,707
Zinc manufactures	.....	53	.....	18,491	.....	54,124	.....	64,980
Brass, old, for re-manufacturing	12,585	1,586	1,068	135	.....	.....	.....	.....
Lead ore, contents	6,724,525	265,205	.....	.....	.....	.....	.....	.....
Bullion, contents	10,944,350	378,286	.....	.....	.....	.....	.....	.....
Lead, pigs and bars	.....	.....	25,421,500	913,806	34,447,599	1,042,141	42,455,113	1,690,151
Lead manufactures	.....	1,810	.....	432	.....	31	.....	40,081
Lead used in articles exported with benefit of drawback	7,595,127	[1]301,500	11,416,486	[1]431,500	6,040,015	[1]262,700	1,926,287	[1]90,535
Zinc used in articles exported with benefit of drawback	3,761,879	[1]198,400	6,200,279	[1]330,500	[1]510,678	[1]65,000	223,053	[1]27,658
	.....	9,409,251	.....	21,832,495	.....	51,062,729	.....	76,434,233

[1] Represents the value of the metal used in making the articles exported with benefit of drawback.

Exports of zinc from the United States, by 6-month periods, 1914–1915, by destination, in short tons

Destination.	Spelter and Sheet Zinc.							
	1914.				1915.			
	January–June.		July–December.		January–June.		July–December.	
	Domestic.	Foreign.	Domestic.	Foreign.	Domestic.	Foreign.	Domestic.	Foreign.
Canada	.....	167	3,383	539	2,918	382	6,561	203
Great Britain	45	.....	40,802	2,897	31,100	3,477	23,452	1,644
Netherlands	.....	.....	.....	.....	.....	.....	12	.....
Belgium	.....	.....	.....	.....	.....	.....	.....	.....
France	.....	.....	8,463	1,902	15,849	1,396	9,406	4,668
Italy	.....	.....	1,651	.....	2,717	448	6,051	504
Germany	84	.....	.....	.....	.....	.....	.....	.....
Russia	667	.....	4,152	.....	6,671	.....	5,420	.....
Japan	.....	.....	456	.....	187	.....	470	.....
Other countries	34	.....	5,070	75	4,926	.....	2,256	997
	830	167	63,977	5,413	64,368	5,703	53,428	8,016

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Exports of zinc from the United States, by months, 1914–1915, in short tons

Month.	Spelter and Sheet Zinc.		
	Domestic.	Foreign.	Foreign Zinc Used in Articles Exported with Benefit of Drawback.
1914.			
January	230	28	
February	18	.....	
March	146	.....	1,881
April	60	.....	
May	107	112	
June	269	27	
July	157	.....	
August	3,448	319	
September	19,045	1,120	
October	10,259	1,140	3,100
November	12,747	957	
December	18,321	1,877	
	64,807	5,580	4,981
1915.			
January	15,299	84	
February	15,002	2,016	
March	8,120	1,136	
April	8,842	77	255
May	7,635	1,104	
June	9,470	1,236	
July	5,951	1,876	
August	6,938	757	
September	8,653	2,122	112
October	12,133	606	
November	10,019	2,343	
December	9,704	310	
	117,796	13,719	367

It is interesting to study the figures of spelter production by quarters, and note the effect of the increasing prices and smelting capacity on the output of the different districts.

PRODUCTION OF SPELTER BY QUARTERS[1]

(In tons of 2000 lb.)

Reports of ore smelters only

District.	I.	II.	III.	IV.
		1913.		
Illinois	27,924	28,523	26,118	28,986
Kansas-Missouri	22,006	23,320	19,204	20,127
Oklahoma	21,430	21,840	18,502	21,456
Others (a)	20,722	20,153	19,238	18,211
Totals	92,082	94,336	83,062	88,782
		1914.		
Illinois	31,005	32,482	32,512	34,584
Kansas-Missouri	13,939	14,559	13,193	11,633
Oklahoma	22,563	22,960	22,946	23,999
Others (a)	22,717	22,715	24,106	24,296
Totals	90,224	92,816	92,756	94,516
		1915.		
Illinois	35,786	39,511	41,791	44,577
Kansas-Missouri	14,090	24,554	32,152	40,256
Oklahoma	24,713	26,984	28,613	31,095
Others (a)	26,255	30,575	31,360	34,830
Totals	100,844	121,624	133,916	150,758

(a) With the exception of one plant in Colorado these are all Eastern works. In the fourth quarter of 1915 is included Anaconda production.

[1] W. R. Ingalls, *Eng. Min. Jour.*

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The production of spelter by quarters showed a steady increase, especially in the second quarter, when the important new plants of 1914—Rose Lake and Langeloth—began to strike their gait, when several of the older smelters began to get new furnaces in operation, and when the resumption of work in several previously idle plants—especially Caney, Dearing and Altoona—began to count largely in the production. In the third quarter several of the small coal smelteries of olden times, one or two new ones and some of the older, almost forgotten, natural-gas plants began to come in. In the fourth quarter the new plants, whereof the construction was instituted in 1915, began to figure, especially Kusa, Donora and Owen, and some of the older plants that had been enlarged—such as Sand Springs, Meadowbrook and one of the Iola works—contributed to the swelling of the output.

However, the total addition of the large new plants—like Kusa and Donora—to the production in 1915 was relatively small. Up to the end of the year they had succeeded in getting but comparatively few furnaces into operation, but had arrived at a position whence they would progress rapidly. Another group of new plants was about ready to come in. This portended a further increase in production in the first quarter of 1916.

Spelter Production According to Fuel.—Of the total spelter production of the ore smelters in 1911, concerns using coal as fuel produced 119,989 tons, or about 40 per cent. of the total. In 1912 they produced 134,077 tons, which was only about 38 per cent. of the total. In 1913 their production was 157,653 tons, or about 44 per cent. of the total; in 1914 it was 173,520 tons, or about 48 per cent. of the total. The remainder of the production was made by smelters using natural gas as fuel. Up to 1915 there was a general tendency toward increasing production by the smelters using coal as fuel, their proportion of the total output having risen from 40 per cent. in 1911 to 48 per cent. in 1914. In 1915 it fell to 45 per cent., in spite of the revival of smelting at Pittsburg, Kan., which is easily explained. There were a lot of inactive natural-gas smelteries that could be put quickly into operation, which was done, and moreover, it was quicker and easier to build new plants in the natural-gas fields than in the coal fields.

General Conditions of Ore Supply.—The outstanding features of 1915 were the extraordinary increase in the production of Montana, the large increases in those of New Jersey, Idaho, and Tennessee, and the generality of the increase among nearly all of the other States. Colorado was the only important State to show a decrease, and that may not really have been experienced, for the reason that Colorado ore may

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have gone to oxide manufacturers rather than to smelters. Even more interesting is the extraordinarily large importation of foreign ore, which came most largely from Broken Hill, N. S. W., and next largely from Mexico. The magnitude of the Mexican imports is surprising in view of the political troubles existing in that country. Included in the ore receipts from other foreign countries was a considerable quantity from the north of Africa and from China. Lately ore has been coming from Sardinia.

The reports as to ore receipts give some interesting indications as to practice in smelting and as to marked conditions. The smelters who make sulphuric acid continued, as in the past, to draw their ore mainly from Wisconsin, and from the Joplin district (including Oklahoma). For the manufacture of sulphuric acid this ore is recognized to be superior, but it is noteworthy that several of the zinc-acid makers are using a larger and larger proportion of Western ore. An interesting feature of 1915 was that the major part of the new smelters—not making acid—confined themselves to Joplin ore. Apparently they desired to begin with the kind of ore easiest to smelt. All told, there were 11 smelters in 1915 who used nothing but Joplin and Wisconsin ore and 7 smelters who used none of that ore.

Those smelters who did not figure in the Joplin market were chiefly concerns whose geographical position does not permit them to do so; or concerns that make a specialty of smelting calamine, or who in 1915 confined themselves to calamine for other reasons. Without examining this matter very closely, one gets the impression from the statistical reports that the zinc smelters figured more generally in the Joplin market than they had done for several years previous. This is explained by several considerations. New concerns entering the smelting business in Kansas and Oklahoma would naturally take Joplin ore, which is relatively easy to smelt, while the successful handling of the Western ores requires a good deal of experience. A matter of more importance and one that attracted the older smelters back to the Joplin market was that the Joplin market was the easiest in which to do business. It was a spot market, where the buyer could obtain his ore immediately, and where he was under no obligation to buy if he did not want to. This relieved him from the onus of taking in ore on long-time contracts, the prevailing system with respect to Western ores, which became highly dangerous with the conditions existing in the spelter market in 1915.

In 1915 Australian ore was received at 10 smelteries, the major part of which were east of the Mississippi River, but several of which were in Oklahoma and Kansas. There were 7 smelteries at which practically nothing but calamine was used. In some cases this was attribut-

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able to the special practice of the smelters operating these works; in others it was for the reason that the roasting furnaces of new plants were not ready and it was easiest to begin smelting in this way.

Ore Smelted.—The smelters reported that in 1915 they treated 848,776 tons of blende and 349,299 tons of calamine, a total of 1,188,075 tons. In 1914 they smelted 628,886 tons of blende and 226,549 tons of calamine, a total of 855,435 tons. That a larger proportion of calamine was being smelted was the common conjecture during the year. Calamine was sought especially for the reason that roasting furnaces are not necessary for its treatment, and even in 1914 American zinc smelters were short in roasting capacity, as was pointed out in the *Engineering and Mining Journal* of Feb. 27,1915. An average grade of 50 per cent. for the ore smelted is indicated in both years. Offhand it might have been assumed that the average in 1915 would figure lower than in 1914, for the reason that the high price tended to stimulate the production of low-grade ore. In so far as the miner is concerned that was probably the case, but about all zinc ore has to be concentrated anyhow, and it is always desirable to raise the grade as high as possible. Certain important producers allowed the grade of their product to fall off a little in order to get more through their mills, but this was apparently offset by the high-grade ore that the smelters were able to get from other quarters. On their part the smelters wanted high-grade ore in order to make as much spelter as possible, and the ore supply was so bountiful that they could exercise considerable choice as to what they would take.

In 1914 the production of floated blende concentrate was nearly 100,000 tons. This increased in 1915, having been in the neighborhood of 250,000 tons. The good handling of this troublesome material is one of the present great problems of the smelters, but in view of the importance of the flotation process they simply have to solve it. About 100,000 tons of American spelter, not counting any derived from Australian material, was obtained from floated concentrates in 1915.

Receipts of Ore.—In 1915 the smelters received 1,257,528 tons of ore, compared with 872,767 tons in 1914. The sources of the ore receipts for a series of years are shown in the accompanying table. This table gives the ore receipts reported as taken in by the smelters, distributed according to origin. This is not equivalent to the ore production of the several States, inasmuch as ore that went to the zinc-oxide plants at Coffeyville, Kan., Mineral Point, Wis., and Palmerton, Pa., is not included. For this reason the ore received by the smelters of spelter from New Jersey (included in "other States"), Colorado, New Mexico and Wisconsin was considerably less than the outputs of those States.

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With those exceptions, however, the figures in the table probably correspond closely with the productions of the several States.

RECEIPTS OF ZINC ORE

(In tons of 2000 lb. This table includes the receipts of ore by the smelters only and does not include the production of ore exported or what was taken by the manufacturers of zinc oxide)

State.	1910. (a)	1911. (a)	1912.	1913.	1914.	1915.
Arizona	7,568	6,395	11,937	9,347	6,357	14,718
Arkansas	190	860	1,567	1,500	1,737	7,017
California	(d)	3,754	6,639	6,796	8,527	27,445
Colorado	77,065	158,528	212,423	220,166	164,739	146,359
Idaho	10,248	9,667	19,482	31,835	57,001	75,767
Kentucky	179	575	947	441	434	1,863
Missouri-Kansas	289,913	268,500	289,177	280,000	247,723	275,099
Montana	33,514	56,593	34,034	91,257	125,653	200,528
Nevada	4,915	5,666	20,654	22,313	20,447	24,949
New Mexico	15,959	10,184	25,889	14,593	15,369	37,042
Oklahoma	1,640	8,750	4,325	23,500	25,247	25,231
Tennessee	2,775	3,439	6,635	5,297	18,708	38,527
Utah	27,318	19,933	24,539	27,073	20,322	21,535
Wisconsin (b)	51,383	71,565	90,782	89,662	74,311	90,128
Others	46,905	44,896	56,099	57,241	57,936	122,490
Totals	569,572	669,305	805,109	884,021	845,821	1,116,698
Mexico	29,198	28,596	29,436	19,965	16,414	49,171
Canada	11,795	2,356	9,707	6,012	10,532	14,000
Australia	.....	.....	.....	.....	.....	68,448
Other foreign	.....	.....	.....	.....	.....	9,211
Grand totals (c)	610,565	700,257	844,252	909,998 (c)	872,767	1,257,528

(a) Smelters' receipts: reports missing from three small smelters. (b) Including Illinois and Iowa. (c) In addition to the ore reported from Canada and Mexico, zinc smelters received a few thousand tons from Europe and Eastern Siberia in 1913. (d) Included in "Others."

The aggregate of ore receipts was much larger than the aggregate of the ore smelted. This was also the case in 1914. However, in 1915 the excess was very much larger. The explanation of this feature in both years is of course the stocking up of new plants. In 1915 this was a very important factor in view of the large number of new plants that were put into operation. In certain cases, as for example, Langeloth, Tiltonville and Donora, this is a permanent absorption. In other cases, where new plants were put into commission in 1915 with the probability of only ephemeral operation, their stock of ore will some day be released.

Sulphuric Acid.—In 1915 there were 10 smelters who produced sulphuric acid from blende, the Donora Zinc Co. being an addition to the list. It is often good business to roast the blende at a good center for the distribution of the sulphuric acid, and re-ship the roasted ore to a good point for zinc distillation. The Western Chemical Co. has for a long time roasted ore at Denver Colo., and sold the product to smelters. The National Zinc Co. has no roasting furnaces at its smeltery at Springfield, Ill., which gets its ore from the roasting plant of the company at Argentine, Kan. Similarly the Grasselli Chemical Co. roasts at Canton, Cincinnati, Newcastle, Cleveland and Grasselli the ore that is needed by its smelteries at Clarksburg and Meadowbrook. The New Jersey Zinc Co. has a roasting plant at Tiltonville, Ohio, which supplies other

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smelters. With the movement of the zinc smelting industry to the eastward, the separation of blende roasting and zinc distillation is becoming more marked, as it has been for a long time in Europe. It will appear from this that the definition between zinc smelters' acid and acid derived from other sources is becoming more and more uncertain.

The manner in which spelter production in 1915 was expanded is one of the romances of our industry. The incentive to this was of course the enormous profit to be realized.

It must be clearly understood that the high prices of 1915 were determined by an extraordinary demand, insistent, and indifferent as to what had to be paid; and to a deficiency of supply that was due to shortage of smelting capacity, not of ore. The high prices were paid therefore for the use of smelting capacity. There was at all times a plethora of ore, and the price for the latter rose therefore in far less proportion than did that of spelter; in other words, the smelting margin increased and did in fact attain such figures as $50 or $60 per ton. It being thus a smelters' market, miners found difficulty in placing their ore at all. The Butte & Superior company consequently made arrangements with the American Zinc, Lead and Smelting Co. for re-opening the Caney and Dearing smelteries. The United States Smelting Co., in order to dispose of ore production of its own, purchased the old plants at Altoona, Iola and La Harpe. When the purchase was made, it looked like a very hazardous venture. Even more so looked the enterprise of George E. Nicholson, when he started the construction of a big new plant at Kusa, which could not even begin production until late in the year. Much less risky was the program of the United States Steel Corporation in building at Donora, for that company as the largest consumer of spelter was planning a permanent business. In this case, however, a wonderful record in construction was made. For the building of such a plant about 18 months would ordinarily be reckoned. At Donora, ground was broken about the end of June and the first spelter was made on Oct. 20. However, the plant could not be regarded as completed until about Mar. 31, 1916, and considering that the construction was carried on night and day, with all of the great facilities of the Steel Corporation, the actual time of 9 months is not greatly out of tune with the common estimate of 18 months, but this is not to minimize the really remarkable feat of the Donora engineers.

As time wore on and people became used to the idea of phenomenal prices for spelter and as the market failed to show signs of collapse, the building of new plants was commenced on all hands. At the present writing—the end of March, 1916—they are springing up like weeds and it is almost useless to try and enumerate them. What then of the

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future? Simply that the shortage of smelting capacity is bringing about its own correction.

Reverting once more to the statistics of spelter production in 1915, there are three very remarkable features. The first is the enormous total. Next is the rapid gain in production, quarter by quarter. In the last quarter of 1914 the production was about 94,500 tons. The production of the first quarter of 1915 advanced by about 5000 tons; the second quarter by about 20,000 tons, this being the quarter when the old idle works were restored to operation; the third quarter by about 12,000 tons; and the fourth quarter by about 17,000 tons. The third noteworthy feature is that the great new plants, including Kusa and Donora, produced but little spelter in 1915. However, at the very end of the year they were just about beginning to strike their gait. Increasing outputs in the first and second quarters of 1916 therefore are to be anticipated without taking into consideration any more new plants.

In fact, at the end of 1915 the listed smelters of the United States possessed a total of about 155,000 retorts, and all of them were reported in use at that time. Reckoning a production of 4.2 tons of spelter per annum per retort, the rate of production at that time was 650,000 tons per annum, or 162,000 tons per quarter. Besides that there were 23,234 retorts reported in process of building at the end of 1915, this number corresponding to an output of about 97,500 tons of spelter per annum.

As if this were not enough, there was the Trail production of electrolytic spelter at the rate of about 12,000 tons per annum, scheduled to begin in January, the Anaconda production at the rate of 35,000 tons per annum, expected to begin late in the summer, and a certain production at Garfield, Utah. The total production in prospect was, therefore, 794,000 tons per annum. There were enough odds and ends in sight, but not enumerated, to justify talking about a total of 800,000 tons per annum, even at the beginning of 1916. Since then the prospect has been materially enlarged.

High-grade Spelter.—One of the noteworthy features of 1915 was the special demand for intermediate and high-grade spelter. Prices of 30 to 40 cts. per lb. for those sorts led several concerns to enter upon their manufacture besides the New Jersey Zinc Co., which previously had possessed substantially a monopoly of this business. The new concerns entered this market by the smelting of selected ore and by the re-distillation of common spelter. It would have been interesting to have had statistics of production of spelter according to class, so as to have some measure of the magnitude of the market for the high-grade and intermediate sorts, but the smelters who were engaged in this manufacture were averse to such a disclosure.

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ZINC.

(GENERAL REPORT.)

By C. E. SIEBENTHAL.

SUMMARY.

Spelter produced and consumed in the United States, 1910–1916, in short tons.

	1910	1911	1912	1913	1914	1915	1916
Production of primary spelter: [a]							
From domestic ore	252,479	271,621	323,907	337,252	343,418	458,135	563,451
From foreign ore	16,705	14,905	14,899	9,424	9,631	31,384	104,005
	269,184	286,526	338,806	346,676	353,049	489,519	667,456
Production of secondary spelter: [a]							
Redistilled	12,784	14,043	26,064	25,991	20,545	29,764	29,663
Remelted	28,439	26,470	26,187	24,014	22,424	23,136	21,037
	310,407	327,039	391,057	396,681	396,018	542,419	718,156
Apparent consumption of primary spelter	245,884	280,059	340,341	295,370	299,125	364,632	458,428

[a] "Primary spelter," which is produced directly from ore, is here distinguished from "secondary spelter," which is obtained by refining zinc ashes, skimmings, drosses, and old metals. The statistics of secondary spelter are given on page 813. Wherever in this report the word "spelter" is used without qualification it means primary spelter.

The production of primary spelter from domestic ores in 1916 was 563,451 short tons, valued at $151,005,000, based on the average selling price, as compared with 458,135 short tons, valued at $113,617,000, based on the average selling price, in 1915—an increase of 105,316 tons, or about 23 per cent, in quantity and of $37,388,000, or about 33 per cent, in value.

INTRODUCTION.

Though the publication of this report has been so greatly delayed by the press of work growing out of the war that it has value only as a statistical record, the essential figures have been available since the beginning of 1917.

A statement of the production and consumption of spelter during the first six months of 1916 was published August 15, 1916. A preliminary estimate of the production of primary spelter in 1916, based on reports received from every zinc smelter in operation, giving the actual production for the first 11 months of 1916 and estimates for the remainder of the year, was issued in the form of a press bulletin on January 3, 1917. A statement giving the final figures of production and consumption of spelter in 1916 was published April 9, 1917. This statement gave a list of smelters and

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electrolytic zinc plants brought up to date, a list of the new plants under construction and contemplated, tables showing exports of zinc and manufacture of zinc by months and tables showing imports of zinc ore and exports of spelter by countries, and set forth the results of the stimulus of the war on the zinc industry of the United States by six-month periods. It also gave a chart showing the range through 1914–1916 of the weekly average price of spelter at St. Louis and London and of the weekly average price of 60 per cent concentrates and the weekly sales of concentrates in the Joplin region.

The statistics of production in this country have been compiled by the United States Geological Survey from confidential reports from each zinc-smelting company in operation during 1916. Statistics of the recovery of secondary zinc were collected from all the important secondary smelters and refiners. The statistics of domestic consumption are taken in part from the smelter returns and in part from the records of the Bureau of Foreign and Domestic Commerce of the Department of Commerce, and the tables for foreign production and consumption were compiled from the sources indicated.

PRODUCTION.

ANNUAL PRODUCTION, 1873–1916.

The production of spelter in the United States began in an experimental way in 1858,[1] and regular production began in 1860 at the Lehigh Zinc Works in the East and at the Matthiesson & Hegeler works in the West. Between 1864 and 1870 nine or ten other zinc smelters were established. Statistics of production are recorded for the years 1873 and 1875 and for the census year ending May 31, 1880. Annual statistics have been collected by the United States Geological Survey since 1882. The progress of the zinc-smelting industry since 1873 is shown in the following table:

Spelter produced in the United States from domestic and foreign ores, 1873–1916, in short tons.

Year.	From foreign ore.	From domestic ore.	Total.	Year.	From foreign ore.	From domestic ore.	Total.
1873	.....	7,343	7,343	1898	.....	115,399	115,399
1875	.....	15,833	15,833	1899	.....	129,051	129,051
1880 (census year)	.....	23,239	23,239	1900	.....	123,886	123,886
1882	.....	33,765	33,765	1901	.....	140,822	140,822
1883	.....	36,872	36,872	1902	.....	156,927	156,927
1884	.....	38,544	38,544	1903	.....	159,219	159,219
1885	.....	40,688	40,688	1904	.....	[a] 186,702	186,702
1886	.....	42,641	42,641	1905	.....	[a] 203,849	203,849
1887	.....	50,340	50,340	1906	25,076	199,694	224,770
1888	.....	55,903	55,903	1907	26,115	223,745	249,860
1889	.....	58,860	58,860	1908	19,675	190,749	210,424
1890	.....	63,683	63,683	1909	25,535	230,225	255,760
1891	.....	80,873	80,873	1910	16,705	252,479	269,184
1892	.....	87,260	87,260	1911	14,905	271,621	286,526
1893	.....	78,832	78,832	1912	14,899	323,907	338,806
1894	.....	75,328	75,328	1913	9,424	337,252	346,676
1895	.....	89,686	89,686	1914	9,631	343,418	353,049
1896	.....	81,499	81,499	1915	31,384	458,135	489,519
1897	.....	99,980	99,980	1916	104,005	563,451	667,456

[a] Including an unknown quantity smelted from foreign ore, small in 1904, but larger in 1905.

[1] Ingalls, W. R., Lead and zinc in the United States, p. 314, 1908.

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Spelter produced in the United States, 1906–1916, apportioned according to States in which it was smelted, in short tons.

Year.	Eastern and Southern States.	Illinois.	Missouri.	Kansas.	Oklahoma.	Colorado.	Total.
1906	29,930	47,939	11,077	129,564	.....	6,260	224,770
1907	37,626	56,056	11,732	134,108	5,035	5,303	249,860
1908	32,738	50,244	10,201	99,298	14,864	3,079	210,424
1909	42,941	67,653	7,037	103,299	28,782	6,048	255,760
1910	43,606	73,038	5,571	105,697	34,760	6,512	269,184
1911	47,155	83,130	4,116	98,443	46,315	7,397	286,526
1912	56,252	88,397	7,085	101,104	76,925	9,043	338,806
1913	69,063	106,654	5,095	74,106	83,214	8,554	346,678
1914	77,593	127,946	3,550	44,510	91,367	8,083	353,049
1915	103,409	159,958	6,754	101,423	109,208	8,767	489,519
1916	159,387	181,433	8,317	141,286	168,206	8,827	667,456

ZINC DUST.

Zinc dust has been marketed by domestic smelters since 1910. The United States Zinc Co., at Pueblo, Colo., was the first to prepare it for the market; the Grasselli Chemical Co. followed later; and one by one other companies began to save zinc dust, until in 1916 the companies named below reported production. Some of these companies saved zinc dust for the first time in 1914, 1915, or 1916, from the incentive supplied by the high price of zinc dust consequent upon the inability of Belgium and Germany to export any to the United States.

American Zinc & Chemical Co., Langeloth, Pa.
Anaconda Copper Mining Co., Great Falls, Mont.
Clarksburg Zinc Co., Clarksburg, W. Va.
Grasselli Chemical Co., Clarksburg, W. Va.
Illinois Zinc Co., Peru, Ill.
Mineral Point Zinc Co., Depue, Ill.
National Zinc Co., Bartlesville, Okla., and Springfield, Ill.
New Jersey Zinc Co., Palmerton, Pa.
United States Smelting Co., Altoona, Kans.
United States Zinc Co., Pueblo, Colo.

The following table gives the output of zinc dust since its first production in a commercial way in the United States:

Production of zinc dust in the United States, 1910–1916.

	Short tons.		Short tons.
1910	69	1914	1,004
1911	254	1915	1,755
1912	492	1916	2,609
1913	423		

As will be seen from the table of imports of zinc dust given on page 823, the imports fell off about two-thirds in 1915 and were still smaller in 1916, on account of the increased domestic production.

ZINC PIGMENTS.

Zinc forms the base, either in whole or in part, of four white pigments—zinc oxide, leaded zinc oxide, zinc-lead oxide, and lithopone. All of these may be and in the United States the first three usually have been made directly from zinc ore. No zinc-lead oxide has been made since 1909, when the plant at Canon City, Colo., was closed. The output of zinc oxide and leaded zinc oxide may not be disclosed, as it was confined to one large producer and one or two smaller ones.

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Lithopone is an intimate mixture by chemical precipitation of zinc sulphide and barium sulphate. It may be manufactured from ore, spelter, or zinc oxide, but in the United States it is generally made from zinc skimmings, zinc ashes, and scrap zinc. The production of lithopone is growing rapidly, as is shown in the following table. The figures for 1906–1914 inclusive represent marketed product and those for subsequent years give the total quantity produced.

Lithopone produced in the United States, 1906–1916, in short tons.

1906	4,300	1912	24,220
1907	10,275	1913	29,685
1908	8,292	1914	32,819
1909	14,847	1915	43,422
1910	12,655	1916	57,960
1911	16,866		

The zinc content of the various pigments made in the United States from ore, both domestic and foreign, for the period 1908–1916, is given in the table below. On page 813 a portion of the secondary zinc recovered in the form of pigments is given.

Primary zinc content of zinc pigments made in the United States, 1908–1916, in short tons.

1908	48,004	1913	70,622
1909	54,139	1914	70,619
1910	50,592	1915	79,572
1911	46,122	1916	90,276
1912	64,032		

SECONDARY ZINC.

By the ordinary method of galvanizing, in which the material to be coated is dipped into a bath of molten zinc, there is a great loss of zinc in the form of semioxidized skimmings and of hard zinc drosses, consisting of the alloy formed by the zinc with the iron of the tank and the iron of the article that is being galvanized. The larger galvanizing plants have furnaces to resmelt these skimmings and drosses and to recover the spelter. There are also many small plants and some large ones which make a practice of buying galvanizer's skimmings and drosses and of recovering the spelter. A considerable quantity of old metal in the form of various alloys of zinc with copper and other metals is also worked over and brought up to the desired composition by the addition of new metal. At almost every brass foundry and machine shop in the country it is the custom to remelt and use brass filings, grindings, and scrap copper and brass, and it is manifestly impracticable to attempt to take full account of such material. Some of the zinc smelters running on ore find it advantageous to work in a quantity of secondary material, because the loss of zinc in distillation is practically a fixed quantity per charge, whether the charge is of low or high tenor. If secondary material high in zinc is mixed with low-grade ore, the loss per unit of metal recovered is thereby greatly lessened. Where this is done the smelters make proper returns to the United States Geological Survey, and in these reports prior to 1907 account has been taken of such production, the output being recorded as dross or secondary spelter. As such spelter has been recovered by redistillation, it is practically indistinguishable in quality from spelter of ordinary grades made from ore. Several secondary smelters recover zinc from drosses by redistillation,

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and these plants are included in the list of smelters on a later page. In the table below the secondary spelter recovered by redistillation is separated from that recovered by remelting. The canvass of secondary smelters was made by J. P. Dunlop, of the United States Geological Survey.

Secondary zinc produced in the United States, 1911–1916, in short tons.

	1911	1912	1913	1914	1915	1916
Secondary spelter, redistilled	14,043	26,064	25,991	20,545	29,764	29,663
Secondary spelter, remelted	26,470	26,187	24,014	22,424	23,136	21,037
Recovered zinc in alloys, excluding old brass remelted	3,223	3,912	3,743	3,914	5,300	2,600
Recovered zinc in remelted brass	24,110	28,426	25,822	24,759	34,375	61,700
Secondary zinc recovered as metal	67,846	84,589	79,570	71,642	92,575	115,000
Secondary zinc recovered in pigment	3,036	4,619	3,705	6,536	8,323	8,749
Secondary zinc recovered in zinc chlorides[a]	3,865	4,903	6,253	6,429	7,860	6,319
Total secondary zinc	74,747	94,111	89,528	84,607	108,758	130,000

[a] These figures include only the quantity of zinc chloride used in wood preservation and were furnished by courtesy of the Forest Service, Department of Agriculture.

COMPARISON OF TOTALS BASED ON SMELTER AND MINE REPORTS.

The figures of the production of spelter given in the foregoing pages are compiled from reports from individual zinc smelters. Since 1904 statistics of the production of the more valuable metals in the Western States have been obtained by the United States Geological Survey from reports of individual mines, and since 1907 this compilation has been extended over the whole country. In order to put the smelter production on the same basis as the mine figures, all the zinc which is manufactured into pigments directly from ore (exclusive of the quantity in zinc oxide manufactured from spelter, the inclusion of which would entail its duplication in the totals) is added to the production of metallic zinc. The zinc dust recovered during the year is also included here. The zinc recovered from secondary sources is excluded, for it has already been once reckoned as spelter. These facts must be borne in mind in comparing the subjoined table with the table showing the production of spelter.

Comparison of production of domestic zinc by smelters and by mines, 1907–1916, in short tons.

	Totals compiled from smelter reports.	Totals compiled from mine reports.	Smelter excess.	Mine excess.
1907	280,676	259,951	20,725	.....
1908	238,030	234,526	3,504	.....
1909	283,173	305,423	.....	22,250
1910	303,139	327,712	.....	24,573
1911	315,029	345,260	.....	30,231
1912	386,783	378,816	7,967	.....
1913	408,289	406,416	1,873	.....
1914	424,672	406,959	17,713	.....
1915	539,074	586,491	.....	47,417
1916	656,075	701,995	.....	45,920
	3,834,940	3,953,549	.....	118,609

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The smelter totals represent actual recovery and are found by summing up the total production reported by all companies and calculating all pigments and zinc dust back to equivalent metallic zinc on the basis of average analysis of product. In compiling the mine totals each producing operator is requested to report actual quantity of zinc ores and concentrates shipped, and from these returns the zinc content is reckoned by assay value. From that zinc content 10 to 20 per cent, according to the character of the ore, is deducted for smelting losses, and the sum of the remainders thus obtained from all the producing properties in each State gives the total for the State. Where the ore is concentrated at a custom mill, proper allowance is also made for the loss of metal in the process. It is clear that by either method the correctness of the totals is dependent upon complete and correct returns from each producing mine and smelter. It is further essential to the correctness of the mine totals that the assay content and the theoretical recovery be correctly estimated. The totals, as compiled from smelter reports and from mine reports, respectively, should be in reasonable agreement. As a matter of fact, for any year they show considerable divergence. These discrepancies, giving rise to "smelter excess" or "mine excess," may be the result of one cause or of a combination of causes, among which are lag in the smelting of the ore, resulting in accumulation of ore stocks at the smelters; lag in the mining, owing to which the smelter depletes its ore stocks; error in calculating metallic content from assay and in estimating recovery.

The smelter reports give the exact annual production of zinc and serve as a check on the mine production, and they also give the form in which the zinc was recovered, whether as spelter or as pigment. For more exact statements of distribution of zinc production according to origin, recourse must be had to the reports of production by mines.

MINE PRODUCTION.

Mine production of zinc in the United States, 1907–1916, in short tons.

	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916
Arizona	114	339	2,989	2,742	2,281	4,379	4,714	4,896	9,110	9,830
Arkansas	474	605	510	994	664	748	478	608	5,209	6,815
California	116	.....	.....	.....	1,404	2,173	529	195	6,547	7,628
Colorado	26,394	15,065	25,606	38,545	47,304	66,111	59,673	48,387	52,297	67,143
Idaho	3,493	19	676	2,802	4,170	6,953	11,587	21,006	35,077	43,253
Illinois	737	1,717	2,163	3,549	4,219	4,065	2,236	4,811	5,534	3,404
Iowa	145	395	35	96	.....	.....	.....	.....	.....	21
Kansas	17,772	14,119	11,445	13,229	10,272	10,633	10,088	11,284	14,365	12,448
Kentucky	.....	.....	56	6	158	491	327	230	764	1,096
Missouri	116,752	107,404	130,162	128,589	122,515	136,551	124,963	105,994	136,300	155,960
Montana	122	820	4,680	15,819	21,905	13,459	44,337	55,790	93,573	114,630
Nevada	1,084	558	1,507	1,354	1,774	6,661	7,210	6,490	12,188	16,222
New Hampshire	.....	.....	.....	.....	.....	.....	15	6	24	36
New Jersey	69,369	67,165	82,510	68,678	77,445	69,755	72,156	74,253	116,618	110,698
New Mexico	375	1,788	6,543	9,044	5,119	6,783	8,262	9,202	12,702	18,285
New York	.....	.....	.....	.....	81	.....	.....	.....	2,456	4,507
North Carolina	.....	.....	.....	.....	.....	142	10	.....	.....	.....
Oklahoma	1,657	4,529	7,806	6,394	5,150	5,769	11,664	13,992	14,314	28,754
Tennessee	109	344	596	966	1,117	2,191	5,583	10,425	16,461	26,428
Texas	22	18	.....	.....	.....	119	326	108	15	116
Utah	2,726	730	4,930	8,184	8,920	8,534	9,429	7,995	12,146	14,786
Virginia	.....	705	58	794	1,032	249	2,719	174	1,267	2,276
Washington	.....	.....	.....	.....	10	.....	.....	.....	122	847
Wisconsin	18,490	18,206	23,152	25,927	29,720	33,060	30,110	31,113	41,403	56,803
	259,951	234,526	305,423	327,712	345,260	378,816	406,418	406,959	586,491	701,995

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The following table shows, for each zinc-producing State, the total quantity of zinc ore produced and the output of each kind of zinc ore. The column headed "All other ore" includes lead ore, copper ore, copper-lead ore, and dry or siliceous ore, no zinc of consequence being recovered from any of them except in California, Colorado, and Montana. "Dry" ores produced in Colorado in 1916 contained 3,700 short tons of recoverable zinc. Copper-zinc ores produced in California contained 4,104 tons of recoverable zinc, and similar ores produced in Montana contained 1,932 tons of recoverable zinc. These ores, however, were concentrated from parts of the ore from certain counties and were not distributed through the whole of the "All other ore" credited to those States in 1916. The total crude ore yielding either gold, silver, copper, lead, or zinc is given for each zinc-producing State, so that a comparison may be made of the relative extent of deep mining operations for all five metals in these States, the quantity of crude ore raised being the best measure for this purpose. The table discloses the fact that Missouri produced between one-fourth and one-fifth of the crude-ore output of the zinc-producing States, her production being 18,664,024 short tons of crude ore, of which 13,196,400 tons was zinc bearing. Exclusive of iron ore, this was the largest production of metalliferous crude ore in the United States. Next in rank was Arizona, with 17,033,810 tons of crude copper ore; Utah ranked third, with 13,920,643 tons of crude ore. Michigan, which formerly ranked second in quantity of crude ore raised, was fourth in 1916, with 12,364,114 tons.

The table gives also the quantity of recoverable zinc contained in the crude ores of each State and the quantity of zinc recovered from each kind of zinc ore. The percentage of recoverable zinc contained in the zinc ore and the zinc-lead ore of each State is also shown. The recoverable zinc content of crude zinc ore ranged from 35 per cent for a small quantity produced in Washington down to 1.1 per cent in Missouri; the Western States show uniformily the higher percentages. The average recoverable zinc content of the zinc ore of the United States in 1916 was 2.4 per cent, as against 2.7 per cent in 1915. Of the total mine production of zinc in 1916, a quantity corresponding to 73.3 per cent was derived from zinc ore, 25 per cent from zinc-lead ore, and 1.5 per cent from all other ores. The figures of mine production of zinc are taken from the chapters on gold, silver, copper, lead, and zinc (mine production) in the various States, as indicated in the prefatory note.

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Mine production of zinc in the United States in 1916.

State.	Zinc ore.			Zinc-lead ore.			All other ore (short tons).		Total. (short tons).	
	Crude ore (short tons).	Recoverable zinc content.		Crude ore (short tons).	Recoverable zinc content.		Crude ore.	Recoverable zinc content.	Crude ore.	Recoverable zinc content.
		Quantity (short tons).	Percentage.		Quantity (short tons).	Percentage.				
Arizona	52,659	5,154	9.8	55,956	3,972	7.1	16,925,195	713	17,033,810	9,839
Arkansas	249,000	6,815	2.7						249,000	6,815
California	29,079	3,485	12.0	1,816	39	2.2	3,156,747	4,104	3,187,642	7,628
Colorado	151,497	26,437	17.4	291,489	37,006	12.7	2,254,257	3,700	2,697,243	67,143
Idaho	23,158	5,851	25.3	1,136,553	37,602	3.3	1,558,334		2,718,045	43,253
Illinois	[a] 288,100	3,404	1.4						[a] 288,100	3,404
Iowa	[b] 1,000	21	2.1						[b] 1,000	21
Kansas	774,400	12,448	1.8						774,400	12,448
Kentucky	[b] 11,000	1,096	10.0						[a] 11,000	1,096
Missouri	13,196,400	155,960	1.1				5,467,624		18,664,024	155,960
Montana	388,380	33,254	8.6	702,885	79,444	11.3	6,789,160	1,932	7,880,425	114,630
Nevada	31,898	9,945	31.2	33,303	6,277	18.8	5,875,976		5,941,185	16,222
New Hampshire				3,500	36	10.2			3,500	36
New Jersey	712,464	110,698	15.5						712,464	110,698
New Mexico	[c] 137,696	18,285	13.3				3,733,254		3,870,950	18,285
New York	40,800	4,507	11.0						40,800	4,507
Oklahoma	1,406,900	28,754	2.0						1,406,900	28,754
Tennessee	702,326	26,428	3.7				482,495		1,184,821	26,428
Texas	443	116	26.2				52,589		53,032	116
Utah	18,400	4,433	24.1	461,866	10,353	2.2	13,440,377		13,920,643	14,786
Virginia	4,480	959	21.4	30,961	1,317	4.2	3,821		39,262	2,276
Washington	154	54	35.0	17,039	793	4.6	147,805		164,998	847
Wisconsin	3,066,500	56,803	2.3						3,066,500	56,803
	21,286,722	514,707	2.4	2,735,368	176,839	6.5	59,867,634	10,449	83,889,724	701,995
Percentage of total recoverable zinc derived from each kind of ore		73.3			25.0			1.5		100.0

[a] Exclusive of fluorspar ore. [b] Estimate. [c] Includes zinc-lead ore.

ZINC-REDUCTION PLANTS.

ELECTROLYTIC ZINC PLANTS.

Electrolytic zinc plants in the United States at the end of 1916.

Company.	Location of plant.	Daily spelter capacity.	Remarks.
American Smelting & Refining Co.	Murray, Utah	Experimental	Operated in 1916.
Anaconda Copper Mining Co.	Anaconda, Mont.	25 tons	Operated in 1915-16.
Do	Great Falls, Mont.	200 tons	Under construction; 100 tons in operation at end of 1916.
Basin Salvage Co.	Basin, Mont.	Experimental	Under construction.
Bully Hill Copper Co.	Bully Hill, Calif.	do	Operated in 1915-16.
Electrolytic Zinc Co.	Baltimore, Md.	10 tons	Operated in 1916.
Judge Mining & Smelting Co.	Park City, Utah	15 tons	Completed March, 1917.
Mammoth Copper Mining Co.	Kennett, Calif.	25 tons	To be completed by May, 1917.
Reed Zinc Co.	Palo Alto, Calif.	Experimental	Operated in 1914-15; idle in 1916.
River Smelting & Refining Co.	Keokuk, Iowa	10 tons	Operated in 1916.

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The rated capacity of the plants listed above was about 40,000 tons annually, but that capacity was attained only near the end of the year. The rated capacity on the completion of plants then under construction was expected to be about 85,000 tons. The output of electrolytic spelter in 1916 was 12,916 tons, of which 1,800 tons was refined from prime western spelter, 887 tons from scrap and drosses, and 10,229 tons from ore.

ZINC SMELTERS.

The following table gives the zinc-smelting capacity of the United States on December 31, 1915 and June 30 and December 31, 1916, as well as the retorts under construction or contemplated at the end of the year. The plants marked "A" operate sulphuric-acid plants, either at the smelter or elsewhere, as indicated in the footnotes.

Zinc smelters in the United States, 1915 and 1916.

	Location of works.	Retorts at end of 1915.	Retorts June 30, 1916.	Retorts at end of 1916.	Additional retorts contemplated or under construction.
ARKANSAS.					
Arkansas Zinc & Smelting Corporation	Van Buren	.....	2,400	3,200	.....
Athletic Mining & Smelting Co	Fort Smith	.....	.....	.....	2,400
Fort Smith Spelter Co	....do	.....	2,560	2,560	.....
		.....	4,960	5,760	2,400
COLORADO.					
United States Zinc Co	Pueblo	2,208	1,944	1,984	264
ILLINOIS.					
American Zinc Co. of Illinois (A)	Hillsboro	4,000	4,864	4,864	.....
Collinsville Zinc Smelter	Collinsville	1,792	2,304	2,304	.....
Granby Mining & Smelting Co. (A)	East St. Louis	3,220	3,220	4,020	800
Hegeler Zinc Co. (A)	Danville	3,600	5,400	5,400	.....
Illinois Zinc Co. (A)	Peru	4,640	4,640	4,640	800
Matthiesson & Hegeler Zinc Co. (A)	La Salle	6,168	6,168	6,168	.....
Missouri Zinc Co	Beckemeyer	352	352	352	.....
Mineral Point Zinc Co. (A)[a]	Depue	9,068	9,068	9,068	.....
National Zinc Co. (A)[b]	Springfield	3,200	4,480	4,480	.....
Robert Lanyon Zinc & Acid Co. (A)	Hillsboro	1,840	3,200	3,200	.....
Sandoval Zinc Co	Sandoval	672	672	672	672
		38,552	44,368	45,968	2,272
KANSAS.					
American Spelter Co	Pittsburg	896	992	992	.....
American Zinc, Lead & Smelting Co	Caney	6,080	6,080	6,080	.....
Do	Dearing	4,480	4,480	4,480	.....
Chanute Spelter Co	Chanute	1,280	1,280	1,280	.....
Cherokee Smelting Co	Bruce	896	896	896	.....
Edgar Zinc Co	Cherryvale	4,800	4,800	4,800	240
Granby Mining & Smelting Co	Neodesha	3,760	3,760	3,760	.....
Iola Zinc Co	Concreto	660	1,320	1,320	.....
Joplin Ore & Spelter Corporation	Pittsburg	1,444	1,792	1,792	.....
Lanyon Smelting Co	....do	448	448	448	.....
Owen Zinc Co	Caney	1,280	1,280	1,920	.....
Pittsburg Zinc Co	Pittsburg	910	910	910	.....
Prime Western Spelter Co. (A)[c]	Gas	4,868	4,868	4,868	.....
United States Smelting Co	Altoona	3,960	4,600	4,600	.....
Do	Iola	3,440	3,440	3,440	.....
Do	La Harpe	1,924	1,924	1,926	.....
Weir Smelting Co	Weir	.....	.....	288	.....
		41,126	42,870	43,800	240

[a] The Mineral Point Zinc Co. also operates an acid plant at Mineral Point, Wis.
[b] The National Zinc Co. has zinc-roasting furnaces at Argentine, Kans., where the sulphur gases are utilized in an acid plant, the roasted concentrates being shipped to the smelter at Springfield, Ill.
[c] The Prime Western Spelter Co. has roasting furnaces and an acid plant at Tiltonville, Ohio.

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Zinc smelters in the United States, 1915 and 1916—Continued.

	Location of works.	Retorts at end of 1915.	Retorts June 30, 1916.	Retorts at close of 1916.	Additional retorts contemplated or under construction.
MISSOURI.					
Edgar Zinc Co.	St. Louis	2,000	2,000	2,000	
Missouri Zinc Smelting Co.	Rich Hill		448	448	
Nevada Smelting Co.	Nevada	672	672	672	
		2,672	3,120	3,120	
OKLAHOMA.					
Bartlesville Zinc Co.	Bartlesville	5,184	6,336	6,336	
Do.	Blackwell		1,800	9,600	
Do.	Collinsville	10,752	13,440	13,440	
Bartlesville Zinc Co. (Lanyon-Starr plant).	Bartlesville	3,456	3,456	3,456	
Eagle-Picher Lead Co.	Henryetta			4,000	
Henryetta Spelter Co.	do		3,000	3,000	
Kusa Spelter Co.	Kusa	2,720	7,720	7,720	
National Zinc Co.	Bartlesville	4,970	4,970	4,970	
Oklahoma Spelter Co.	Kusa		1,600	1,600	
Quinton Spelter Co.	Quinton			1,344	1,344
Tulsa Fuel & Manufacturing Co.	Collinsville	6,232	6,232	6,232	
United States Smelting Co.	Checotah		2,560	5,120	
United States Zinc Co.	Sand Springs	5,680	8,000	8,000	200
Western Spelter Co.	Henryetta			2,400	
		39,994	58,914	77,218	1,544
PENNSYLVANIA.					
American Steel & Wire Co. (A)	Donora	3,648	9,120	9,120	
American Zinc & Chemical Co. (A)	Langeloth	3,648	6,384	7,296	
New Jersey Zinc Co. (of Pennsylvania)	Palmerton	6,720	6,960	7,200	
		14,016	22,464	23,616	
WEST VIRGINIA.					
Clarksburg Zinc Co.	Clarksburg	3,648	3,648	3,648	
Grasselli Chemical Co. (A)[a]	do	5,760	5,760	5,760	
Do.	Meadowbrook	8,592	8,592	8,544	
United Zinc Smelting Corporation (A).	Moundsville				6,912
		18,000	18,000	17,952	6,912
		156,568	196,640	219,418	13,632
PLANTS WITH SPECIAL RETORTS.[b]					
Eastern Zinc Refining Co.	Brooklyn, N. Y.			8	16
John Finn Metal Works	San Francisco, Calif.			2	1
Michael Hayman & Co.	Buffalo, N. Y.	12	12	12	
M. M. S. Metal Co.	Trenton, N. J.		21	21	
Trenton Smelting & Refining Co.	do	96	96	96	
William Cramp & Sons Ship & Engine Building Co.	Philadelphia, Pa.	32	32	32	
Total large retorts		140	161	171	17

[a] The Grasselli Chemical Co. operates acid plants in connection with its zinc-roasting furnaces at Grasselli, Ind., Cleveland, Canton, and Lockland (near Cincinnati), Ohio, and Newcastle, Pa., the roasted zinc concentrates being shipped to the smelters at Clarksburg and Meadowbrook, W. Va.

[b] Large graphite retorts yielding 600–800 pounds of spelter per charge.

The foregoing list includes a few retort smelters that treat only secondary materials, such as zinc ashes, skimmings, and galvanizers' drosses; also a few that recover about equal quantities of spelter from ores and from secondary materials, as well as several more that treat minor quantities of secondary materials. Several other zinc-smelting plants in the country obtain spelter by the distillation

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of zinc ashes and drosses in large graphite crucibles and condensers somewhat similar to those used in the Faber du Faur furnaces for recovering zinc from the zinc crusts in lead desilverization. These are given at the bottom of the list.

INCREASE IN SMELTING CAPACITY.

The number of retorts at zinc smelters at the end of 1915 was 156,568, and 49,612 additional retorts were being built or were planned, making a total of 206,180. The number of smelters June 30, 1916, was 196,640, and 24,812 additional retorts were being built or were planned, making a total of 221,452. At the end of 1916 the total number of retorts was 219,418, and 13,632 additional retorts were under construction or planned.

The heavy decline in the price of spelter during May, June, and July caused the temporary closing of some of the smaller smelters and the reduction of operation by several others. A canvass by the Survey showed nearly 19,000 idle retorts out of a total of 199,328. Some of the active retorts, however, were being used to treat secondary materials, such as zinc ashes and drosses, and an unknown number of others were engaged in refining the ordinary grade of spelter by redistillation. The number of retorts on August 15 was somewhat larger than that on June 30, owing to the completion of some of those under construction at the earlier date. Between July and December there was a considerable improvement in the price of spelter, and the year ended with fewer retorts idle, the number being about 15,000.

SMELTER CHANGES IN 1916.

Some of the smelters listed as planned early in the year were abandoned, and some other plants never got beyond the promotion stage. On the other hand, work was begun on three smelters not listed. Extensive additions were made to plants already in existence.

In Pennsylvania the plant of the Donora Zinc Co. was completed and put into full operation, and the plant of the American Zinc & Chemical Co. was increased to double its former capacity.

In West Virginia the United Zinc Smelting Corporation, affiliated with the Clarksburg Zinc Co., broke ground at Moundsville in July for a smelter of 6,912 retorts and an acid plant.

In Illinois additional capacity was installed at Hillsboro (by the American Zinc Co. of Illinois and the Robert Lanyon Zinc & Acid Co.), at Collinsville, at Danville, and at Springfield. The Granby Mining & Smelting Co. made an addition of 1,600 retorts at East St. Louis, and a block of retorts was under construction December 31 at East St. Louis and at Peru.

In Missouri the old coal-fired smelter at Rich Hill was rebuilt by the Missouri Zinc Smelting Co.

In Kansas another block of 660 retorts was erected by the Iola Zinc Co. at Concreto. Additions were made by the Joplin Ore & Spelter Corporation at Pittsburg, by the Owen Zinc Co. at Caney, and by the United States Smelting Co. at Altoona. At Weir City, the site of the first zinc smelter west of St. Louis, the Weir Smelting Co. built a small coal-fired smelter.

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In Oklahoma the Bartlesville Zinc Co. erected a smelter of 9,600 retorts at Blackwell. At Henryetta the Henryetta Spelter Co. completed a 3,000-retort smelter and the Eagle-Picher Lead Co. one of 4,000 retorts. At Kusa the La Harpe Spelter Co. built a plant of 4,000 retorts, which was absorbed by the Kusa Spelter Co., and the Oklahoma Spelter Co. built a plant of 1,600 retorts. The Quinton Spelter Co. erected 1,340 retorts at Quinton, and the J. B. Kirk Gas Smelting Co. built a plant with 2,560 retorts at Checotah. On August 15 the United States Smelting Co. traded its plant at Iola Kans., for the plant at Checotah and doubled its capacity. The United States Zinc Co. added 2,320 retorts at Sand Springs, and the Bartlesville Zinc Co. added 1,152 retorts at Bartlesville and 2,688 at Collinsville, making the Collinsville smelter, with 13,440 retorts, by far the largest zinc smelter in the world.

In Arkansas the Fort Smith Spelter Co. built a smelter with 2,560 retorts at Fort Smith, and the Arkansas Zinc & Smelting Corporation erected a plant of 2,400 retorts at Van Buren. The Athletic Mining & Smelting Co. began the construction of a plant of 2,400 retorts. All these plants draw natural gas from pools in the vicinity of Fort Smith.

The American Zinc, Lead & Smelting Co. took over the Granby Mining & Smelting Co., acquiring mining lands and a lead smelter in Missouri, a natural-gas zinc smelter at Neodesha, Kans., and the new smelter at East St. Louis. For a time at least the corporate identity of the Granby Co. will be preserved.

TRADE CONDITIONS.

WORLD'S PRODUCTION.

Owing to the disturbed conditions in Europe, complete figures of the world's production of spelter in 1914–1916 can not be given. In the subjoined table the fragmentary statistics for those years were obtained from consular reports, official reports, mining journals, or any other source available.

The following spelter statistics prior to 1914, apportioned according to the country where the ore was smelted and not according to the source of the ore, are the figures of Henry R. Merton & Co., of London, taken from the annual statistical publication for 1913 of the Metallgesellschaft, the Metallurgische Gesellschaft, A.-G., and the Berg und Metallbank Aktiengesellschaft of Frankfort on the Main, Germany, except that the figures for the United States are those of the United States Geological Survey:

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UNITED STATES GEOLOGICAL SURVEY
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MINERAL RESOURCES

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1917

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ZINC.

(GENERAL REPORT.)

By C. E. SIEBENTHAL.

SUMMARY.

Zinc produced and consumed in the United States, 1911–1917, in short tons.

	1911	1912	1913	1914	1915	1916	1917
Production of primary zinc: [a]							
From domestic ore	271,631	323,907	337,252	343,418	458,135	563,451	584,597
From foreign ore	14,905	14,899	9,424	9,631	31,384	104,005	84,976
	286,536	338,806	346,676	353,049	489,519	667,456	669,573
Production of secondary zinc: [a]							
Redistilled	14,043	26,064	25,991	20,545	29,764	29,663	16,535
Remelted	26,470	26,187	24,014	22,424	23,136	21,037	14,865
	327,039	391,057	396,681	396,018	542,419	718,156	700,973
Apparent consumption of primary zinc	280,059	340,341	296,370	299,125	364,632	458,428	413,643

[a] "Primary zinc," which is produced directly from ore, is here distinguished from "secondary zinc," which is obtained by refining zinc ashes, skimmings, drosses, and old metals. The statistics of secondary zinc are given on page 860. Wherever in this report the word "zinc" is used without qualification it means primary zinc.

The production of primary zinc from domestic ores in 1917 was 584,597 short tons, valued at $119,258,000, based on the average selling price, as compared with 563,451 short tons, valued at $151,005,000, based on the average selling price, in 1916—an increase of 21,146 tons, or about 4 per cent, in quantity and a decrease of $31,747,000, or about 21 per cent, in value.

INTRODUCTION.

Though the publication of this final report has been so greatly delayed by the press of work growing out of the war that it has value mainly as a statistical record, the essential figures were made available to the public early in 1918.

The statistics of production in this country have been compiled by the United States Geological Survey from confidential reports from each zinc-smelting company in operation during 1917. Statistics of the recovery of secondary zinc were collected from all the important secondary smelters and refiners. The statistics of domestic consumption are taken in part from the smelter returns and in part from the records of the Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce, and the tables for foreign production and consumption were compiled from the sources indicated.

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PRODUCTION.

ANNUAL PRODUCTION, 1873–1917.

The smelting of zinc in the United States began in an experimental way in 1858,[1] and regular production began in 1860 at the Lehigh Zinc Works in the East and at the Matthiesson & Hegeler works in the West. Between 1864 and 1870 nine or ten other zinc smelters were established. Statistics of production are recorded for the years 1873 and 1875 and for the census year ending May 31, 1880. Annual statistics have been collected by the United States Geological Survey since 1882. The progress of the zinc-smelting industry since 1873 is shown in the following table:

Zinc produced in the United States from domestic and foreign ores, 1873–1917, in short tons.

Year.	From foreign ore.	From domestic ore.	Total.	Year.	From foreign ore.	From domestic ore.	Total.
1873	.....	7,343	7,343	1899	.....	129,051	129,051
1875	.....	15,833	15,833	1900	.....	123,886	123,886
1880 (census year)	.....	23,239	23,239	1901	.....	140,822	140,822
1882	.....	33,765	33,765	1902	.....	156,927	156,927
1883	.....	36,872	36,872	1903	.....	159,219	159,219
1884	.....	38,544	38,544	1904	.....	a186,702	186,702
1885	.....	40,688	40,688	1905	.....	a203,849	203,849
1886	.....	42,641	42,641	1906	25,076	199,694	224,770
1887	.....	50,340	50,340	1907	26,115	223,745	249,860
1888	.....	55,903	55,903	1908	19,675	190,749	210,424
1889	.....	58,860	58,860	1909	25,535	230,225	255,760
1890	.....	63,683	63,683	1910	16,705	252,479	269,184
1891	.....	80,873	80,873	1911	14,905	271,621	286,526
1892	.....	87,260	87,260	1912	14,899	323,907	338,806
1893	.....	78,832	78,832	1913	9,424	337,252	346,676
1894	.....	75,328	75,328	1914	9,631	343,418	353,049
1895	.....	89,686	89,686	1915	31,384	458,135	489,519
1896	.....	81,499	81,499	1916	104,005	563,451	667,456
1897	.....	99,980	99,980	1917	84,976	584,597	669,573
1898	.....	115,399	115,399				

a Including an unknown quantity smelted from foreign ore, small in 1904, but larger in 1905.

Zinc produced in the United States, 1906–1917, apportioned according to States in which it was made, in short tons.

Year.	Arkansas.	Illinois.	Kansas.	Oklahoma.	Pennsylvania.	Other States.	Electrolytic zinc.	Total.
1906	.....	47,989	129,564	.....	8,659	38,608	.....	224,770
1907	.....	56,056	134,108	5,035	11,266	43,395	.....	249,860
1908	.....	50,244	99,298	14,864	6,818	39,200	.....	210,424
1909	.....	67,653	103,299	28,782	15,222	40,804	.....	255,760
1910	.....	73,038	105,697	34,760	16,459	39,230	.....	269,184
1911	.....	83,120	98,413	46,315	15,337	43,331	.....	286,526
1912	.....	88,397	101,104	76,925	18,254	54,126	.....	338,806
1913	.....	106,654	74,106	83,214	26,934	55,768	.....	346,676
1914	.....	127,946	44,510	91,367	28,096	61,131	.....	352,049
1915	.....	159,958	101,423	109,208	44,167	74,511	252	489,519
1916	7,503	181,433	141,288	168,206	76,545	82,254	10,229	667,456
1917	25,660	172,489	76,048	204,394	86,995	78,778	25,209	669,573

[1] Ingalls, W. R., Lead and zinc in the United States, p. 314, 1908.

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ROLLED ZINC.

For many years nearly all the sheet zinc made in the United States was produced by two of the older and larger companies—the Matthiessen & Hegeler Zinc Co., of La Salle, Ill., and the Illinois Zinc Co., in the adjoining town of Peru, Ill. Other companies, particularly the manufacturers of glass fruit jars having zinc tops, have rolled zinc for their own use, and some that furnish sheet zinc to lithographers have also rolled their own zinc. The great demand since the beginning of the war for sheet zinc to line packing cases made for shipment overseas, especially cases containing munitions or other material that is likely to be affected by salt air, has led still other firms into the business of rolling zinc. In addition to the two companies mentioned specifically above the following firms now make rolled zinc: Ball Brothers Glass Manufacturing Co., Muncie, Ind.; Hazel Atlas Glass Co., Wheeling, W. Va.; New Jersey Zinc Co., Palmerton, Pa.; American Zinc Products Co., Greencastle, Ind.; Edes Manufacturing Co., Plymouth, Mass.; E. Phillips & Sons, South Hanover, Mass.; and The Platt Brothers & Co., Waterbury, Conn.

The United States Geological Survey has for many years collected statistics showing the production of zinc, but while the output of rolled zinc was practically limited to that of the two companies in Illinois mentioned above the Survey could not publish statistics showing that output without disclosing individual business. The increase in the number of producers, however, has now made it possible to give these figures. A canvass of the industry by the writer gives the statistics presented in the following table. If the figures showing the exports, as published by the Bureau of Foreign and Domestic Commerce, are subtracted from the figures showing the production, the result will represent the domestic consumption. It should be borne in mind, however, that the sheet zinc used by the Government in shipping munitions overseas is not reported as exported.

Zinc rolled in the United States, 1915–1917.

	1915	1916	1917
Zinc sheets:			
Quantity.....pounds..	69,007,725	65,836,170	75,730,006
Value.....	$9,744,026	$12,280,644	$13,854,600
Average value per pound.....	$0.141	$0.187	$0.183
Boiler plates and special sheets:			
Quantity.....pounds..	2,562,856	3,198,693	6,000,293
Value.....	$345,572	$664,814	$1,111,240
Average value per pound.....	$0.135	$0.177	$0.161
Zinc strips:			
Quantity.....pounds..	20,208,058	26,039,105	35,802,652
Value.....	$2,937,313	$5,008,229	$5,738,285
Average value per pound.....	$0.145	$0.179	$0.16
Total rolled zinc.....pounds..	91,778,639	97,073,968	118,432,951
Total value.....	$13,026,811	$17,853,687	$20,704,125
Average value per pound.....	$0.142	$0.184	$0.175
Rolled zinc exported:			
Quantity.....pounds..	.....	25,024,182	33,027,991
Value.....	.....	$4,540,146	$5,730,792
Average value per pound.....	.....	$0.181	$0.174
Domestic consumption of rolled zinc.....pounds..	.....	72,049,786	85,404,960

The New Jersey Zinc Co. made its first output in 1917, and the American Zinc Products Co. in 1918. Additions to capacity amount-

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ing to nearly 50 per cent are being made at four of the principal mills to meet the increased demand for zinc for war uses and that which will result from the prevailing strong movement to find and establish new uses for sheet zinc and to extend the present uses. Every such extension, especially the substitution of sheet zinc for sheet copper and brass and for tin plate, will stimulate the zinc market and relieve to some extent the shortage of copper and tin. The War Industries Board ordered the use of sheet zinc instead of galvanized iron or steel for refrigerator linings, a use that was expected to require about 10,000 tons of rolled zinc. Sheet zinc can also be substituted for galvanized iron in roofing, spouting, guttering, garages, household utensils, and hospital ware.

Rolled zinc has always been quoted at so much per pound with discounts and extras for different gages and special sizes and shapes. In 1914, according to Metal Statistics, the base price ranged from 7 to 8.75 cents a pound. In 1915 the price began at 8.75 cents and rose to 33 cents on June 9, fell to 15 cents August 23, and rose to 23 cents at the end of the year. In 1916 the price reached 25.5 cents on April 22, but dropped to 15 cents on July 11 and ended the year at 21 cents. In 1917 the base price of sheet zinc remained nearly stationary, declining to 20 cents on April 25 and to 19 cents on April 26. On February 15, 1918, the base price of zinc sheets was fixed by the Government at 15 cents and the price of rolled zinc plates at 14 cents.

Both the production and the value by classes of product given in the table are subject to slight correction because some producers that sell from a single base price do not keep their sales separated according to classes of product (which are arbitrary anyhow) and were to that extent obliged to make estimates; others, who themselves use the greater part of their output, had to estimate values. But the total production, value, and average price given may be considered accurate. The average price agrees closely with the average price shown by the exporters' manifests.

ZINC DUST.

Zinc dust has been marketed by domestic smelters since 1910. The United States Zinc Co., at Pueblo, Colo., was the first to prepare it for the market; the Grasselli Chemical Co. followed later; and one by one other companies began to save zinc dust, until in 1917 all the companies named below reported production, a small part of which consisted of "atomized" zinc dust made by subjecting a small stream of molten zinc to a blast of air. Some of these companies prepared zinc dust for the first time in 1914–1917 by reason of the high price of zinc dust consequent upon the inability of Belgium and Germany to export any to the United States.

American Zinc & Chemical Co., Langeloth, Pa.
Anaconda Copper Mining Co., Great Falls, Mont.
Bartlesville Zinc Co., Bartlesville, Okla.
Clarksburg Zinc Co., Clarksburg, W. Va.
Grasselli Chemical Co., Clarksburg and Meadowbrook, W. Va.
Illinois Zinc Co., Peru, Ill.
Metals Disintegrating Co., New York, N. Y.
National Zinc Co., Bartlesville, Okla., and Springfield, Ill.
New Jersey Zinc Co., Palmerton, Pa.
United States Smelting Co., Altoona, Kans.
United States Zinc Co., Pueblo, Colo.

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The following table gives the output of zinc dust since its first production in a commercial way in the United States:

Zinc dust produced in the United States, 1910–1917.

	Short tons.		Short tons.
1910	69	1914	1,004
1911	254	1915	1,755
1912	492	1916	2,609
1913	423	1917	5,913

As will be seen from the table of imports of zinc dust given on page 871, the imports fell off about two-thirds in 1915 and were still smaller in 1916 and 1917, on account of the increased domestic production.

ZINC PIGMENTS.

Zinc forms the base, either in whole or in part, of four white pigments—zinc oxide, leaded zinc oxide, zinc-lead oxide, and lithopone. All of these may be and in the United States the first three usually have been made directly from zinc ore. No zinc-lead oxide has been made since 1909, when the plant at Canon City, Colo., was closed. The output of zinc oxide and leaded zinc oxide has not been disclosed, as it was confined to one very large producer and several smaller ones.

Lithopone is an intimate mixture by chemical precipitation of zinc sulphide and barium sulphate. It may be manufactured from zinc ore, or zinc oxide, but in the United States it is generally made from zinc skimmings, zinc ashes, and scrap zinc. The production of lithophone is growing rapidly, as is shown in the following table. The figures for 1906–1914, inclusive, represent marketed product and those for subsequent years give the total quantity produced.

Lithopone produced in the United States, 1906–1917, in short tons.

1906	4,300	1912	24,220
1907	10,275	1913	29,685
1908	8,292	1914	32,819
1909	14,847	1915	43,422
1910	12,655	1916	58,196
1911	16,866	1917	64,260

The zinc content of the various pigments made in the United States from ore, both domestic and foreign, for the period 1908–1917, is given in the table below. On page 860 a portion of the secondary zinc recovered in the form of pigments is given.

Primary zinc content of zinc pigments made in the United States, 1908–1917, in short tons.

1908	48,004	1913	70,622
1909	54,139	1914	70,619
1910	50,502	1915	79,572
1911	46,122	1916	90,276
1912	64,032	1917	97,573

SECONDARY ZINC.

By the ordinary method of galvanizing, in which the material to be coated is dipped into a bath of molten zinc, there is a great loss of zinc in the form of semioxidized skimmings and of hard zinc drosses,

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consisting of the alloy formed by the zinc with the iron of the tank and the iron of the article that is being galvanized. The larger galvanizing plants have furnaces to resmelt these skimmings and drosses and to recover the zinc. There are also many small plants and some large ones which make a practice of buying galvanizer's skimmings and drosses and of recovering the zinc. A considerable quantity of old metal in the form of various alloys of zinc with copper and other metals is also worked over and brought up to the desired composition by the addition of new metal. At almost every brass foundry and machine shop in the country it is the custom to remelt and use brass filings, grindings, and scrap copper and brass, and it is manifestly impracticable to attempt to take full account of such material. Some of the zinc smelters running on ore find it advantageous to work in a quantity of secondary material, because the loss of zinc in distillation is practically a fixed quantity per charge, whether the charge is of low or high tenor. If secondary material high in zinc is mixed with low-grade ore, the loss per unit of metal recovered is thereby greatly lessened. Where this is done the smelters make proper returns to the United States Geological Survey, and in these reports prior to 1907 account has been taken of such production, the output being recorded as dross or secondary zinc. As such metal has been recovered by redistillation, it is practically indistinguishable in quality from zinc of ordinary grades made from ore. Several secondary smelters recover zinc from drosses by redistillation, and these plants are included in the list of smelters on a later page. In the table below the secondary zinc recovered by redistillation is separated from that recovered by remelting. The canvass of secondary smelters was made by J. P. Dunlop, of the United States Geological Survey.

Secondary zinc produced in the United States, 1912–1917, in short tons.

	1912	1913	1914	1915	1916	1917
Secondary zinc, redistilled	26,064	25,991	20,545	29,764	29,663	16,835
Secondary zinc, remelted	26,187	24,014	22,424	23,136	21,037	14,585
Recovered zinc in alloys, excluding old brass remelted	3,912	3,743	3,914	5,300	2,600	4,500
Recovered zinc in remelted brass	28,426	25,822	24,759	34,375	61,700	80,000
Secondary zinc recovered as metal	84,589	79,570	71,642	92,575	115,000	116,200
Secondary zinc recovered in pigment	4,619	3,705	6,536	8,323	8,749	9,204
Secondary zinc recovered in zinc chloride [a]	4,903	6,253	6,429	7,860	6,319	6,248
Total secondary zinc	94,111	89,528	84,607	108,758	130,000	132,000

[a] These figures include only the quantity of zinc chloride used in wood preservation and were furnished by courtesy of the Forest Service, Department of Agriculture.

COMPARISON OF PRODUCTION BASED ON SMELTER AND ON MINE REPORTS.

The figures of the production of domestic zinc given in the foregoing pages are compiled from reports from individual zinc smelters. Since 1904 statistics of the production of the more valuable metals in the Western States have been obtained by the United States Geological Survey from reports of individual mines, and since 1907 this compilation has been extended over the whole country. In order

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to put the smelter production on the same basis as the mine figures, all the zinc which is manufactured into pigments directly from ore (exclusive of the quantity in zinc oxide manufactured from metallic zinc, the inclusion of which would entail its duplication in the totals) is added to the production of metallic zinc. The zinc dust ("blue powder" only, not "atomized" zinc dust—made from metallic zinc—for the reason given above) produced during the year is also included here. The zinc recovered from secondary sources is excluded, for it has already been once reckoned as zinc. These facts must be borne in mind in comparing the subjoined table with the table showing the production of zinc.

Comparison of production of domestic zinc by smelters and by mines, 1907–1917, in short tons.

Year.	Totals compiled from smelter reports.	Totals compiled from mine reports.	Smelter excess.	Mine excess.
1907	280,676	259,951	20,725	.....
1908	238,030	234,526	3,504	.....
1909	283,173	305,423	.....	22,250
1910	303,139	327,712	.....	24,573
1911	315,029	345,260	.....	30,231
1912	386,783	378,816	7,967	.....
1913	408,289	406,416	1,873	.....
1914	424,672	406,959	17,713	.....
1915	539,074	586,491	.....	47,417
1916	656,075	703,317	.....	47,242
1917	686,604	713,359	.....	26,755
	4,521,544	4,668,220	.....	146,686

The smelter totals represent actual recovery and are found by summing up the total production reported by all companies and calculating all pigments and zinc dust back to equivalent metallic zinc on the basis of average analysis of product. In compiling the mine totals each producing operator is requested to report actual quantity of zinc ores and concentrates shipped, and from these returns the zinc content is reckoned by assay value. From that zinc content 10 to 20 per cent, according to the character of the ore, is deducted for smelting losses, and the sum of the remainders thus obtained from all the producing properties in each State gives the total for the State. Where the ore is concentrated at a custom mill, proper allowance is also made for the loss of metal in the process. It is clear that by either method the correctness of the totals is dependent upon complete and correct returns from each producing mine and smelter. It is further essential to the correctness of the mine totals that the assay content and the theoretical recovery be correctly estimated. The totals, as compiled from smelter reports and from mine reports, respectively, should be in reasonable agreement. As a matter of fact, for any year they show considerable divergence. These discrepancies, giving rise to "smelter excess" or "mine excess," may be the result of one cause or of a combination of causes, among which are lag in the smelting of the ore, resulting in accumulation of ore stocks at the smelters; lag in the mining, owing to which the smelter depletes its ore stocks; error in calculating metallic content from assay and in estimating recovery.

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The smelter reports give the exact annual production of zinc and serve as a check on the mine production, and they also give the form in which the zinc was recovered, whether as metal or as pigment. For more exact statements of distribution of zinc production according to origin, recourse must be had to the reports of production by mines.

MINE PRODUCTION.

Mine production of zinc in the United States, 1908–1917, in short tons.

State.	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917
Arizona	339	2,989	2,742	2,281	4,379	4,714	4,896	9,110	9,839	10,447
Arkansas	605	510	994	664	748	478	618	3,209	6,815	6,691
California	.....	.....	.....	1,404	2,173	529	195	6,547	7,628	5,436
Colorado	15,065	25,605	38,545	47,304	66,111	59,673	48,397	52,297	67,143	60,158
Idaho	19	676	2,802	4,170	6,953	11,587	21,006	35,077	43,253	39,927
Illinois	1,717	2,163	3,549	4,219	4,065	2,236	4,811	5,534	3,404	4,267
Iowa	395	35	96	.....	.....	.....	.....	.....	21	18
Kansas	14,119	11,445	13,229	10,272	10,633	10,058	11,284	14,365	12,448	20,249
Kentucky	.....	56	6	158	491	327	230	764	1,096	751
Missouri	107,404	130,162	128,589	122,515	136,551	124,943	105,994	136,300	155,960	132,918
Montana	820	4,680	15,819	21,005	13,459	44,337	55,700	93,573	114,630	93,130
Nevada	558	1,507	1,354	1,774	6,661	7,210	6,490	12,188	16,222	11,154
New Hampshire	.....	.....	.....	.....	.....	15	6	24	36	45
New Jersey	67,165	82,510	68,678	77,445	69,755	72,156	74,253	116,618	112,020	120,846
New Mexico	1,788	6,543	9,044	6,119	6,783	8,262	9,202	12,702	18,285	15,100
New York	.....	.....	.....	81	.....	.....	.....	2,455	4,507	5,192
North Carolina	.....	.....	.....	.....	142	10	.....	.....	.....	.....
Oklahoma	4,529	7,806	6,394	5,150	5,769	11,664	13,992	14,814	28,754	85,535
Tennessee	344	596	966	1,127	2,191	5,583	10,425	16,461	26,428	28,498
Texas	18	.....	.....	.....	119	326	108	15	116	11
Utah	730	4,930	8,184	8,920	8,534	9,429	7,905	12,146	14,786	10,643
Virginia	705	58	794	1,032	249	2,719	174	1,267	2,276	1,703
Washington	.....	.....	.....	10	.....	.....	.....	122	847	598
Wisconsin	18,206	23,152	25,927	29,720	33,050	35,110	31,113	41,403	56,803	59,742
	234,526	305,423	327,712	345,280	378,816	406,416	406,959	586,491	703,317	713,359

The following table shows for each zinc-producing State the total quantity of zinc ore produced and the output of each kind of zinc-bearing ore. The column headed "All other ore" includes lead ore, copper ore, copper-lead ore, and dry or siliceous ore, no zinc of consequence being recovered from any of them except in California and Colorado. "Dry" ores produced in Colorado in 1917 contained 1,549 short tons of recoverable zinc. Copper-zinc ores produced in California contained 3,459 tons of recoverable zinc. These ores, however, were concentrated from parts of the ore from certain counties and were not distributed through the whole of the "All other ore" credited to those States in 1917. The total crude ore yielding either gold, silver, copper, lead, or zinc is given for each zinc-producing State, so that a comparison may be made of the relative extent of deep mining operations for all five metals in these States, the quantity of crude ore raised being the best measure for this purpose. The table discloses the fact that Missouri produced a little more than one-fifth of the crude-ore output of the zinc-producing States, her production being 17,024,000 short tons of crude ore, of which 11,136,100 tons was zinc-lead ore. Exclusive of iron ore, this was the largest production of metalliferous crude ore in the United States. Next in rank was Arizona, with 15,770,193 tons of crude copper ore; Utah ranked third, with 15,358,481 tons of crude ore. Michigan, which formerly ranked second in quantity of crude ore raised, was fourth in 1917, with 12,400,723 tons.

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The table gives also the quantity of recoverable zinc contained in the crude ores of each State and the quantity of zinc recovered from each kind of zinc ore. The percentage of recoverable zinc contained in the zinc ore and the zinc-lead ore of each State is also shown. The recoverable zinc content of crude-zinc ore ranged from 42.4 per cent for a small quantity produced in California down to 2.1 per cent in Tennessee; the Western States show uniformly the higher percentages. The zinc-lead ore of Missouri averaged 1.2 per cent of recoverable zinc—the leanest average shown by zinc-bearing ore worked in any State in 1917. The average recoverable zinc content of the zinc ore of the United States in 1917 was 9 per cent, and of the zinc-lead ore was 2.2 per cent. Of the total mine production of zinc in 1917, a quantity corresponding to 31.7 per cent was derived from zinc ore, 67.5 per cent from zinc-lead ore, and 0.8 per cent from all other ores. The figures of mine production of zinc are taken from the chapters on gold, silver, copper, lead, and zinc (mine production) in the various States, as indicated in the prefatory note.

Mine production of zinc in the United States in 1917, in short tons.

State.	Zinc ore.			Zinc-lead ore.			All other ore.		Total.	
	Crude ore.	Recoverable zinc content.		Crude ore.	Recoverable zinc content.		Crude ore.	Recoverable zinc content.	Crude ore.	Recoverable zinc content.
		Quantity.	Percentage.		Quantity.	Percentage.				
Arizona	62,839	5,309	8.5	49,071	4,738	9.7	15,658,283	400	15,770,193	10,447
Arkansas	203,600	6,691	3.3						203,600	6,691
California	125	53	42.4	26,501	1,924	7.3	2,976,624	3,459	3,003,250	5,436
Colorado	140,455	23,791	16.9	412,371	34,818	8.4	2,135,880	1,549	2,688,706	60,158
Idaho	19,269	5,412	28.1	1,118,075	34,515	3.1	1,621,163		2,758,507	39,927
Illinois				327,340	4,267	1.3	(a)		a 327,340	4,267
Iowa				b 1,000	18	1.8			b 1,000	18
Kansas				903,400	20,249	2.2			903,400	20,249
Kentucky	b 9,000	751	8.3				(a)		a b 9,000	751
Missouri				11,136,100	132,918	1.2	5,887,900		17,024,000	132,918
Montana	258,846	17,016	6.6	726,280	76,051	10.5	5,322,038	63	6,307,164	93,130
Nevada	18,393	5,909	32.1	27,943	5,245	18.8	6,427,183		6,473,519	11,154
New Hampshire				3,000	45	1.5			3,000	45
New Jersey	727,496	120,846	16.6						727,496	120,846
New Mexico	135,129	14,406	10.7	10,899	694	6.4	4,430,799		4,576,827	15,100
New York	47,961	5,192	10.8						47,961	5,192
Oklahoma				3,523,200	85,835	2.4			3,523,200	85,835
Tennessee	883,341	18,239	2.1	61,638	10,259	16.6	589,004		1,533,983	28,498
Texas	40	11	27.5				52,342		52,382	11
Utah	6,535	1,832	28.0	421,704	8,811	2.1	14,930,242		15,358,481	10,643
Virginia	900	328	33.1	34,211	1,375	4.0	350		35,551	1,703
Washington	114	22	19.3	14,953	576	3.9	157,052		172,119	598
Wisconsin				3,014,800	59,742	2.0			3,014,800	59,742
	2,514,133	225,808	9.0	21,812,486	482,080	2.2	60,188,860	5,471	84,515,479	713,359
Percentage of total zinc derived from each kind of ore		31.7			67.5			0.8		100.0

a Exclusive of fluorspar. b Estimated.

Mining districts are established with little heed to the artificial restrictions of political boundaries and may include parts of adjacent States. The following table has been compiled to show the production of zinc in the principal districts so that they may be compared as to extent of zinc mining operations, as shown by the output of crude ore; as to character of ores, whether sulphide or oxidized; and, finally, as to relative rank as zinc producers.

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Districts in the United States producing more than 1,000 short tons of recoverable zinc in 1917.

District.	State.	1917								1915
		Crude zinc-bearing ore sold or treated (short tons).	Shipping ore and concentrates (short tons).					Total recoverable zinc content (short tons).	Percentage of total production.	Total recoverable zinc content (short tons).
			Total quantity.	Sulphides.		Carbonates and silicates.				
				Quantity.	Recoverable zinc content.	Quantity.	Recoverable zinc content.			
1. Joplin	Missouri	3,447,850	263,095	231,402	121,742	30,698	10,988	132,730	18.6	.....
	Kansas	903,400	38,787	38,766	20,242	21	7	20,249	2.8	.....
	Oklahoma	3,523,200	159,780	159,656	85,744	124	45	85,789	12.0	.....
		7,874,450	460,662	429,824	227,728	30,838	11,040	238,768	33.4	164,544
2. Franklin Furnace	New Jersey	727,496	609,282	.....	.....	609,282	120,846	120,846	17.0	116,615
3. Butte	Montana	892,362	287,027	287,027	90,158	.....	.....	90,158	12.6	93,231
4. Upper Mississippi Valley	Wisconsin	3,014,800	226,216	223,916	59,190	2,300	552	59,742	8.4	.....
	Illinois	327,340	18,221	18,221	4,267	.....	.....	4,267	.6	.....
	Iowa	600	60	.....	.....	60	18	18	.....	.....
		3,342,740	244,497	242,137	63,457	2,360	570	64,027	9.0	46,937
5. Coeur d'Alene	Idaho	1,126,606	113,802	113,802	38,862	.....	.....	38,862	5.5	34,843
6. Leadville	Colorado	218,183	218,183	148,945	19,569	69,238	10,558	30,127	4.2	36,212
7. East Tennessee	Tennessee	939,052	67,108	35,708	18,202	31,406	10,296	28,498	4.0	16,461
8. Other Colorado[a]	Colorado	196,178	76,511	[b] 76,511	24,330	.....	.....	24,330	3.4	12,489
9. New Mexico	New Mexico	146,028	62,573	[b] 62,573	15,100	.....	.....	15,100	2.1	12,601
10. Yellow Pine	Nevada	35,655	34,386	.....	.....	34,386	10,267	10,267	1.4	10,530
11. Wallapai (Union Basin)	Arizona	101,706	25,309	25,309	8,564	.....	.....	8,564	1.2	8,691
12. Northern Arkansas	Arkansas	209,600	17,969	916	482	17,053	6,209	6,691	1.0	3,209
13. Edwards	New York	47,961	12,466	12,466	5,192	.....	.....	5,192	0.7	2,455
14. Shasta	California	167,146	11,250	11,250	3,160	.....	.....	3,160	0.5	4,199
15. Park City	Utah	133,231	8,211	8,211	2,601	.....	.....	2,601	0.4	3,886
16. Bingham	....do	175,378	8,880	8,880	2,302	.....	.....	2,302	0.3	2,746
17. San Francisco	....do	47,853	4,970	4,970	1,769	.....	.....	1,769	0.3	1,412
18. Southern Virginia	Virginia	44,000	9,700	2,841	761	6,859	942	1,703	0.2	1,267
19. Cerro Gordo	California	6,400	6,400	.....	.....	6,400	1,685	1,685	0.2	2,328
20. Cataract	Montana	17,965	6,081	6,081	1,678	.....	.....	1,678	0.2	.....
		16,447,110	2,285,267	1,477,446	523,915	807,821	172,413	696,328	97.6	574,749
All other districts		.....	.....	.....	.....	.....	.....	17,031	2.4	11,742
Total for United States		.....	.....	.....	.....	.....	.....	713,359	100.0	586,491

[a] Red Cliff, Breckenridge, Eureka, and Elk Mountain.

[b] Includes carbonates.

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ZINC-REDUCTION PLANTS.

ELECTROLYTIC PLANTS.

Electrolytic zinc plants in the United States and Canada at the end of 1917.

Company.	Location of plant.	Daily capacity.	Remarks.
UNITED STATES.			
American Smelting & Refining Co.	Murray, Utah	Experimental	Operated in 1916; idle in 1917.
Anaconda Copper Mining Co.	Anaconda, Mont	25 tons	Idle in 1917.
Do.	Great Falls, Mont.	150 tons	Operated in 1917.
Basin Salvage Co.	Basin, Mont.	Experimental	Do.
Ducktown Sulphur, Copper & Iron Co.	Isabella, Tenn.	1 ton	Experimental in 1917.
Electrolytic Zinc Co.	Baltimore, Md.	10 tons	Operated in 1917.
Judge Mining & Smelting Co.	Park City, Utah	15 tons	Do.
Mammoth Copper Mining Co.	Kennett, Calif.	25 tons	Began production October, 1917.
River Smelting & Refining Co.	Keokuk, Iowa	10 tons	Operated in 1917.
CANADA.			
Consolidated Mining & Smelting Co. (Ltd.).	Trail, British Columbia.	50 tons	Operated in 1917.
Zinc Co. (Ltd.)	Shawinigan Falls, Quebec.	5 tons	Do.
French Complex Ore Reduction Co.	Frank, British Columbia	Experimental	Do.

The output of electrolytic zinc in the United States in 1917 was 26,910 short tons, of which 25,209 tons was made from ore and 1,701 tons was refined from prime western metal. The output in 1916 was 12,916 tons.

The output in Canada in 1917 was 9,985 tons, as compared to 2,974 tons in 1916, the first year of production.

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ZINC SMELTERS.

The following table gives the zinc-smelting capacity of the United States on December 31, 1916, and June 30, and December 31, 1917, as well as the retorts under construction or contemplated at the end of the year. The plants marked "A" operate sulphuric-acid plants, either at the smelter or elsewhere, as indicated in the footnotes.

Zinc smelters in the United States, 1916 and 1917.

	Location of works.	Retorts at end of 1916.	Retorts, June 30, 1917.	Retorts at end of 1917.
ARKANSAS.				
Arkansas Zinc & Smelting Corporation	Van Buren	3,200	3,200	3,200
Athletic Mining & Smelting Co	Fort Smith	.....	1,664	2,496
Fort Smith Spelter Co	....do	2,560	2,560	2,560
		5,760	7,424	8,256
COLORADO.				
United States Zinc Co	Pueblo	1,984	2,290	1,968
ILLINOIS.				
American Zinc Co. of Illinois (A)	Hillsboro	4,864	4,864	4,864
Collinsville Zinc Smelter	Collinsville	2,304	2,304	2,304
Granby Mining & Smelting Co. (A)	East St. Louis	4,820	5,020	5,020
Hegeler Zinc Co. (A)	Danville	5,400	5,400	5,400
Illinois Zinc Co (A)	Peru	4,640	5,440	5,440
Matthiessen & Hegeler Zinc Co. (A)	La Salle	6,168	6,168	6,168
Missouri Zinc Co	Beckemeyer	252	302	252
Mineral Point Zinc Co (A)a	Depue	9,068	9,068	9,068
National Zinc Co. (A)b	Springfield	4,480	4,480	4,480
Robert Lanyon Zinc & Acid Co. (A)	Hillsboro	3,200	3,200	3,200
Sandoval Zinc Co	Sandoval	672	672	672
		45,968	47,514	47,568
INDIANA.				
Grasselli Chemical Co (A)	Terre Haute	.....	.....	3,360
KANSAS.				
American Spelter Co	Pittsburg	992	992	992
American Zinc, Lead & Smelting Co	Caney	6,080	6,080	6,080
Do	Dearing	4,480	4,480	4,480
Chanute Spelter Co	Chanute	1,280	1,280	(c)
Cherokee Smelting Co	Bruce	896	896	896
Edgar Zinc Co	Cherryvale	4,800	5,040	5,040
Granby Mining & Smelting Co	Neodesha	3,760	3,760	3,760
Iola Zinc Co	Concreto	1,320	1,320	(c)
Joplin Ore & Spelter Corporation	Pittsburg	1,792	1,992	1,992
Lanyon Smelting Co	....do	448	448	448
Owen Zinc Co	Caney	1,920	1,920	1,920
Pittsburg Zinc Co	Pittsburg	910	910	910
Prime Western Spelter Co. (A)d	Iola	2,696	2,696	2,696
Do	Gas	2,170	2,170	2,170
United States Smelting Co	Altoona	4,800	4,800	(c)
Do	Iola	3,440	3,440	3,440
Do	La Harpe	1,926	1,926	(c)
Weir Smelting Co	Weir	288	448	448
		43,800	44,398	35,272

a The Mineral Point Zinc Co. also operates an acid plant at Mineral Point, Wis.
b The National Zinc Co. has zinc-roasting furnaces at Argentine, Kans., where the sulphur gases are utilized in an acid plant, the roasted concentrates being shipped to the smelter at Springfield, Ill.
c Plant dismantled.
d The Prime Western Spelter Co. has roasting furnaces and an acid plant at Tiltonville, Ohio.

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Zinc smelters in the United States, 1916 and 1917—Continued.

	Location of works.	Retorts at end of 1916.	Retorts, June 30, 1917.	Retorts at end of 1917.
MISSOURI.				
Edgar Zinc Co.	St. Louis	2,000	1,992	1,992
Missouri Zinc Smelting Co.	Rich Hill	448	448	448
Nevada Smelting Co.	Nevada	672	672	672
		3,120	3,102	3,102
OKLAHOMA.				
Bartlesville Zinc Co.	Bartlesville	6,336	6,336	6,336
Do.	Blackwell	9,600	9,600	9,600
Do.	Collinsville	13,440	13,440	13,440
Bartlesville Zinc Co. (Lanyon-Starr plant)	Bartlesville	3,456	3,456	3,456
Eagle-Picher Lead Co.	Henryetta	4,000	4,000	4,000
Henryetta Spelter Co.	do.	3,000	3,000	3,000
Kusa Spelter Co.	Kusa	7,720	7,720	7,720
National Zinc Co.	Bartlesville	4,970	4,970	4,970
Oklahoma Spelter Co.	Kusa	1,600	1,600	1,600
Quinton Spelter Co.	Quinton	1,344	2,016	2,016
Tulsa Fuel & Manufacturing Co.	Collinsville	6,232	6,232	6,232
United States Smelting Co.	Checotah	5,120	5,120	5,120
United States Zinc Co.	Sand Springs	8,000	10,992	8,000
Western Spelter Co.	Henryetta	2,400	.....	2,648
		77,218	78,482	78,138
PENNSYLVANIA.				
American Steel & Wire Co. (A)	Donora	9,120	9,120	9,120
American Zinc & Chemical Co. (A)	Langeloth	7,296	7,296	7,296
New Jersey Zinc Co. (of Pennsylvania)	Palmerton	7,200	7,200	7,200
		23,616	23,616	23,616
WEST VIRGINIA.				
Clarksburg Zinc Co.	Clarksburg	3,648	3,648	3,648
Grasselli Chemical Co. (A)[a]	do.	5,760	5,760	5,760
Do.	Meadowbrook	8,544	8,544	8,544
United Zinc Smelting Corporation (A)	Moundsville	.....	.....	1,728
		17,952	17,952	19,680
		219,418	224,778	220,960
PLANTS WITH SPECIAL RETORTS.[b]				
Eastern Zinc Refining Co.	Brooklyn, N. Y.	8	16	16
John Finn Metal Works	San Francisco, Calif.	2	2	2
Michael Hayman & Co.	Buffalo, N. Y.	12	12	12
M. M. S. Metal Co.	Trenton, N. J.	21	15	21
Trenton Smelting & Refining Co.	do.	96	80	60
William Cramp & Sons Ship & Engine Building Co.	Philadelphia, Pa.	32	32	32
Total large retorts		171	157	143

[a] The Grasselli Chemical Co. operates acid plants in connection with its zinc-roasting furnaces at Grasselli, Ind., Cleveland, Canton, and Lockland (near Cincinnati), Ohio, and Newcastle, Pa., the roasted zinc concentrates being shipped to the smelters at Terre Haute, Ind., and Clarksburg and Meadowbrook, W. Va.

[b] Large graphite retorts yielding 600–800 pounds of zinc per charge.

The foregoing list includes a few retort smelters that treat only secondary materials, such as zinc ashes, skimmings, and galvanizers' drosses; also a few that recover about equal quantities of zinc from ores and from secondary materials, as well as several more that treat minor quantities of secondary materials. Several other zinc-smelting plants in the country obtain zinc by the distillation of zinc ashes

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and drosses in large graphite crucibles and condensers somewhat similar to those used in the Faber du Faur furnaces for recovering zinc from the zinc crusts in lead desilverization. These are given at the bottom of the list.

ZINC-SMELTING CAPACITY AND CHANGES IN 1917.

The number of retorts at zinc smelters at the end of 1916 was 219,418, and 13,632 additional retorts were being built or were planned, making a total of 233,050. The number of retorts on June 30, 1917, was 224,778, and 11,944 additional retorts were being built or were planned, making a total of 236,722. Of the total number of retorts at smelters on June 30, only 189,561 were reported to be in operation. Of the total 220,960 retorts at the end of the year, 132,794, or 60 per cent, were reported in active operation on December 31, 1917.

Three zinc smelters, having 7,584 retorts, were completed in 1917. These were the plant of the Athletic Mining & Smelting Co., at Fort Smith, Ark., the plant of the Grasselli Chemical Co., at Terre Haute, Ind., and that of the United Zinc Smelting Corporation, at Moundsville, W. Va. The last plant was designed for 6,912 retorts, but only 1,728 were completed and these were not operated until 1918. The acid plant was in operation in 1917, however, the roasted concentrates being smelted at the Clarksburg plant. Another acid unit is planned. One block of 840 retorts was still under construction at Terre Haute at the end of 1917. A block of 800 retorts was added by the Illinois Zinc Co., at Peru, Ill., and another of the same size was added to the East St. Louis plant of the American Zinc, Lead & Smelting Co. A block of 672 retorts was added at Quinton, Okla. In spite of the addition of more than 10,000 retorts the total at the end of 1917 was 220,960 retorts as compared with 219,418 at the close of 1916, a very small net increase, owing to the dismantling of several smelters in Kansas. It is difficult to ascertain at this time whether a zinc smelter is temporarily or permanently abandoned and hence retort totals are to a certain extent unreliable. Announcement has recently been made that the historic plant of the Edgar Zinc Co., at Carondelet, a surburb of St. Louis, Mo., is closed, never to be reopened. This, a combination of the plants of the old Glendale Zinc Co. and the Carondelet Zinc Co., was one of the first zinc smelters to be built in the Mississippi Valley. It is likely that many other plants in Missouri, Kansas, and Oklahoma, now idle, will never be operated again.

TRADE CONDITIONS.

WORLD'S PRODUCTION.

Owing to the disturbed conditions in Europe, complete figures of the world's production of zinc in 1914–1916 can not be given. It is hoped that better figures will be available for the chapter on zinc for 1918.

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1918

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PART I—METALS

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ZINC.

(GENERAL REPORT.)

By C. E. SIEBENTHAL.

SUMMARY.

Zinc produced and consumed in the United States, 1917–18, in short tons.

	1917	1918
Production of primary zinc: [a]		
From domestic ore	584,597	492,405
From foreign ore	84,976	25,522
	669,573	517,927
Production of secondary zinc: [a]		
Redistilled	16,635	9,918
Remelted	14,565	17,190
	700,973	545,035
Apparent consumption of primary zinc	413,643	423,798

[a] "Primary zinc," which is produced directly from ore, is here distinguished from "secondary zinc," which is obtained by refining zinc ashes, skimmings, drosses, and old metals. The statistics of secondary zinc are given on page 1034. Wherever in this report the word "zinc" is used without qualification it means primary zinc.

The production of primary zinc from domestic ores in 1918 was 492,405 short tons, valued at $89,618,000, based on the average selling price, as compared with 584,597 short tons, valued at $119,258,000, based on the average selling price, in 1917—a decrease of 92,192 tons, or nearly 16 per cent, in quantity and of $29,640,000, or about 25 per cent, in value.

INTRODUCTION.

An estimate of the production of zinc in the United States in 1918 was published on January 2, 1919. That estimate was based on reports from every zinc smelter in operation in 1918, which included actual production for the first 11 months of the year and an estimate of the production in December. The final figures of the production of zinc in 1918 were published June 9, 1919, and in somewhat greater detail in the "Preliminary report on the mineral resources of the United States in 1918," published August 7, 1919. The present report contains, in addition to the statistics given in that statement, tables and curves showing production, value, consumption, imports, exports, and prices for a period of years. Some historical data showing how the zinc industry was affected by the war are also included. A change in the statistics for 1916 is necessitated by the discovery that 887 tons of zinc reported as recovered from secondary

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material was in reality derived from drosses made in reducing ore in the plant itself and hence, never having been reckoned as metallic zinc, was primary zinc.

The statistics of production of zinc in this country in 1918 have been compiled by the United States Geological Survey from confidential reports submitted by each zinc-smelting company in operation during the year. The statistics of the recovery of secondary zinc were also collected by the Geological Survey. The statistics of domestic consumption are taken in part from the smelter returns and in part from the records of the Bureau of Foreign and Domestic Commerce, of the Department of Commerce, and the statistics of foreign production are compiled from the sources indicated in connection with the tables here presented.

PRODUCTION.

TOTAL PRODUCTION.

The smelting of zinc in the United States began in an experimental way in 1858,[1] and regular production began in 1860 at the Lehigh Zinc Works in the East and at the Matthiessen & Hegeler Works in the West. Between 1864 and 1870, 9 or 10 other zinc smelters were established. Annual statistics have been collected by the United States Geological Survey since 1882. The progress of the zinc-smelting industry since that time is shown in the following table:

Zinc produced in the United States from domestic and foreign ores, 1882–1918, in short tons.

Year.	From foreign ore.	From domestic ore.	Total.	Year.	From foreign ore.	From domestic ore.	Total.
1882	.....	33,765	33,765	1901	.....	140,822	140,822
1883	.....	36,872	36,872	1902	.....	156,927	156,927
1884	.....	38,544	38,544	1903	.....	159,219	159,219
1885	.....	40,688	40,688	1904	.....	[a] 186,702	186,702
1886	.....	42,641	42,641	1905	.....	[a] 203,849	203,849
1887	.....	50,340	50,340	1906	25,076	199,694	224,770
1888	.....	55,903	55,903	1907	26,115	223,745	249,860
1889	.....	58,860	58,860	1908	19,675	190,749	210,424
1890	.....	63,683	63,683	1909	25,535	230,225	255,760
1891	.....	80,873	80,873	1910	16,705	252,479	269,184
1892	.....	87,260	87,260	1911	14,906	271,621	286,526
1893	.....	78,332	78,332	1912	14,899	323,907	338,806
1894	.....	75,328	75,328	1913	9,424	337,252	346,676
1895	.....	89,686	89,686	1914	9,631	343,418	353,049
1896	.....	81,499	81,499	1915	31,384	458,135	489,519
1897	.....	99,980	99,980	1916	104,005	[b] 564,338	[b] 668,343
1898	.....	115,399	115,399	1917	84,976	584,597	669,573
1899	.....	129,051	129,051	1918	25,522	492,405	517,927
1900	.....	123,886	123,886				

[a] Including an unknown quantity smelted from foreign ore, small in 1904, but larger in 1905.
[b] Revised figures (see p. 1027.)

The following table shows the source of the primary zinc smelted in the United States since 1906. The extent to which the United States has utilized the zinc ores of her neighbors to the north and the south and her dependence upon the zinc ores of other countries because of the great demands during the World War are readily seen.

[1] Ingalls, W. R., Lead and zinc in the United States, p. 314, 1908.

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Zinc smelted in United States, 1906–1918, apportioned according to sources of ore, in short tons.

Year.	United States.	Canada.	Mexico.	Europe.	Asia.	Australia.	Africa.	Other countries.	Total.
1906	199,694	201	24,875	.....	.....	.....	.....	.....	224,770
1907	223,745	545	25,570	.....	.....	.....	.....	.....	249,860
1908	190,749	2,425	17,250	.....	.....	.....	.....	.....	210,424
1909	230,225	978	24,557	.....	.....	.....	.....	.....	255,760
1910	252,479	3,304	13,401	.....	.....	.....	.....	.....	269,184
1911	271,621	1,598	13,307	.....	.....	.....	.....	.....	286,526
1912	323,907	4,199	10,700	.....	.....	.....	.....	.....	338,806
1913	337,252	1,424	6,206	1,175	620	.....	.....	.....	346,676
1914	343,418	4,538	5,093	.....	.....	.....	.....	.....	353,049
1915	458,135	5,103	13,943	1,073	1,030	10,235	.....	.....	489,519
1916	564,338	24,376	20,894	12,717	1,905	41,958	2,355	.....	668,343
1917	584,597	6,787	40,360	11,689	.....	26,140	.....	.....	669,573
1918	492,405	8,700	14,043	113	.....	1,760	.....	[a] 886	517,927

[a] All South America.

The following table shows the States in which the zinc smelting of the United States has been done since 1906. It shows the beginning of recent zinc smelting in Arkansas and the beginning and great expansion of zinc smelting in Oklahoma. The expansion of zinc smelting in Illinois is also registered, as well as vicissitudes in the zinc-smelting industry of Kansas. The excess of demand for zinc in 1915–16 over active smelting capacity led to the revival of numerous abandoned smelters in Kansas and resulted in 1916 in the largest output of zinc in the State's history. Since that time the increasing cost of natural gas and of labor in the hand-worked plants, together with the low price of zinc, has practically eliminated what had been an important industry in that State since 1874.

Zinc produced in the United States, 1906–1918, apportioned according to States in which smelted, in short tons.

Year.	Illinois.	Kansas.	Oklahoma.	Pennsylvania.	Arkansas	Other States.	Total.
1906	47,939	129,564	.....	8,659	.....	38,608	224,770
1907	56,056	134,108	5,035	11,286	.....	43,395	249,860
1908	50,244	99,298	14,864	6,818	.....	39,200	210,424
1909	67,653	103,299	28,782	15,222	.....	40,804	255,760
1910	73,038	105,697	34,760	16,459	.....	39,230	269,184
1911	83,130	98,413	46,315	15,337	.....	43,331	286,526
1912	88,397	101,104	76,925	18,254	.....	54,126	338,806
1913	106,054	74,106	83,214	26,934	.....	55,768	346,676
1914	127,946	44,510	91,367	28,095	.....	61,131	353,049
1915	159,958	101,423	109,208	44,167	.....	74,763	489,519
1916	181,433	141,286	168,206	76,545	7,503	93,370	668,343
1917	172,489	76,048	204,394	86,995	25,660	103,987	669,573
1918	141,844	29,149	139,066	77,342	26,753	103,773	517,927

The collection of statistics of zinc production at short intervals during the period of participation of the United States in the war gives the data for the following table. As shown by the totals, these figures include redistilled secondary zinc.

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Zinc produced in the United States, 1917–18, by months, in short tons.

Month.	1917	1918
January	62,785	39,896
February	55,593	43,624
March	65,929	53,818
April	63,031	42,504
May	64,680	40,036
June	59,399	47,516
July	57,677	40,033
August	54,960	49,610
September	50,599	40,433
October	53,493	39,687
November	50,113	48,609
December	48,149	42,079
	686,408	527,845

DISTILLED AND ELECTROLYTIC ZINC.

Selected secondary zinc materials, such as zinc ashes and scrap, carefully redistilled, yield zinc of all grades, which enter the market for practically all purposes. Considerable secondary material, as explained on page 1034, is mixed with ore and used by some regular ore smelters. Though the quantity of metal so derived can be calculated by the smelters and thus eliminated from the output of primary zinc, it is practically impossible to segregate the redistilled secondary zinc by grades or in smelter stocks. Hence the smelter stocks as given contain some secondary zinc, and the statistics of production of zinc by grades as given in the table below likewise include secondary zinc. The quantity of secondary zinc included in the graded zinc is given in the second part of the table, which gives the source of the graded zinc by the methods of reduction. The growing output of electrolytic zinc is shown.

During the war, when so much zinc was bought on Government specification, it became the custom to give the grade of zinc by letters, as "grade A," instead of "high grade," "grade B," instead of "intermediate," and so on. A table is given on page 1060 which shows the limits of impurities permissible in the different grades as defined by certain testing societies and Government departments.

Distilled and electrolytic zinc produced in the United States, 1914–1918, in short tons.

Apportioned according to method of reduction.

	1914	1915	1916	1917	1918
Electrolytic	.....	252	[a] 11,116	[a] 25,209	[a] 38,916
Distilled primary	353,049	489,267	657,227	644,364	479,011
Redistilled secondary zinc	20,545	29,764	28,776	16,835	9,918
	373,594	519,283	697,119	686,408	527,845

Apportioned according to grade.

Grade A (high grade)	19,385	54,056	73,405	97,707	129,344
Grade B (intermediate)	32,076	60,751	94,825	69,189	68,987
Grade C (select and brass special)	68,551	93,131	100,875	148,749	98,584
Grade D (prime western)	253,582	302,345	428,014	370,763	230,930
	373,594	519,283	697,119	686,408	527,845

[a] Prime western zinc refined by electrolysis in addition: In 1916, 1,800 tons; in 1917, 1,701 tons; in 1918, 753 tons.

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ROLLED ZINC.

For many years nearly all the sheet zinc made in the United States was produced by two of the older and larger companies—the Matthiessen & Hegeler Zinc Co., of La Salle, Ill., and the Illinois Zinc Co., in the adjoining town of Peru, Ill. Other companies, particularly the manufacturers of glass fruit jars having zinc tops, have rolled zinc for their own use, and some that furnish sheet zinc to lithographers have also rolled their own zinc. The great demand during the war for sheet zinc to line packing cases made for shipment overseas, especially cases containing munitions or other material that was likely to be affected by salt air, led still other firms into the business of rolling zinc. In addition to the two companies specifically mentioned above, the following firms now make rolled zinc: Ball Bros. Glass Manufacturing Co., Muncie, Ind.; Hazel-Atlas Glass Co., Wheeling, W. Va.; New Jersey Zinc Co., Palmerton, Pa.; American Zinc Products Co., Greencastle, Ind.; Edes Manufacturing Co., Plymouth, Mass.; E. Phillips & Sons, South Hanover, Mass.; The Platt Bros. & Co., Waterbury, Conn.; and Scovill Manufacturing Co., Waterbury, Conn.

A canvass of the industry by the United States Geological Survey gives the statistics presented in the following table. If the figures showing exports, as published by the Bureau of Foreign and Domestic Commerce, are subtracted from the figures showing production, the result will represent the apparent domestic consumption. It should be borne in mind, however, that the sheet zinc used by the Government in shipping munitions overseas is not reported as exported.

Zinc rolled in the United States, 1915–1918.

	1915	1916	1917	1918
Zinc sheets:				
Quantity.....pounds..	69,007,725	65,836,170	75,730,006	79,745,237
Value.....	$9,744,026	$12,280,644	$13,854,600	$12,611,294
Average price per pound.....	$0.141	$0.187	$0.183	$0.158
Boiler plates and special sheets:				
Quantity.....pounds..	2,562,856	3,198,693	6,900,293	14,223,673
Value.....	$345,572	$564,814	$1,111,240	$1,912,578
Average price per pound.....	$0.135	$0.177	$0.161	$0.134
Zinc strips:				
Quantity.....pounds..	[a]20,222,628	[a]28,159,495	[a]36,253,122	45,804,915
Value.....	[a]$2,939,330	[a]$5,029,731	[a]$5,810,450	$6,381,582
Average price per pound.....	$0.145	$0.179	$0.160	$0.139
Total rolled zinc:				
Quantity.....pounds..	91,793,209	97,194,358	118,883,421	139,773,825
Value.....	$13,028,928	$17,875,189	$20,776,290	$20,905,454
Average price per pound.....	$0.142	$0.184	$0.175	$0.150
Rolled zinc exported:				
Quantity.....pounds..	.....	25,024,182	33,027,991	27,750,910
Value.....	.....	$4,540,148	$5,730,792	$4,506,756
Average price per pound.....	.....	$0.181	$0.174	$0.165
Apparent consumption of rolled zinc...pounds..	.....	72,170,176	85,856,430	112,023,915

[a] Revised figures.

The New Jersey Zinc Co. made its first output of rolled zinc in 1917, and the American Zinc Products Co. in 1918. Additions to capacity amounting to nearly 50 per cent were made at four of the principal mills to meet the increased demand for sheet zinc for war uses and the demand that will result from the prevailing strong movement to find and establish new uses for sheet zinc and to extend the present uses.

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Rolled zinc has always been quoted at so much a pound with discounts and extras for different gages and special sizes and shapes. In 1914, according to Metal Statistics, the base price ranged from 7 to 8.75 cents a pound. In 1915 the price began at 8.75 cents, rose to 33 cents on June 9, fell to 15 cents on August 23, and rose to 23 cents at the end of the year. In 1916 the price reached 25.5 cents on April 22 but dropped to 15 cents on July 11 and ended the year at 21 cents. In 1917 the base price of sheet zinc remained nearly stationary, declining to 20 cents on April 25 and to 19 cents on April 26. On February 15, 1918, the base price of zinc sheets was fixed by the Government at 15 cents and the price of rolled zinc plates at 14 cents, and these prices prevailed during the remainder of the year. The price of high-grade Joplin concentrates purchased by smelters intending to roll the zinc was fixed by agreement at $75 a ton for concentrates containing 60 per cent of zinc.

Both the production and the value by classes of product given in the table are subject to slight correction, because some producers who sell from a single base price do not keep their sales separated according to classes of product (which are arbitrary, anyhow) and were to that extent obliged to make estimates; others, who themselves use the greater part of their output, had to estimate values. But the total production, value, and average selling price given may be considered accurate. The average selling price agrees closely with the average value shown by the exporter's manifests.

ZINC DUST.

Zinc dust has been marketed by domestic smelters since 1910. The United States Zinc Co., at Pueblo, Colo., was the first to prepare it for the market; the Grasselli Chemical Co. followed later; and one by one other companies began to save zinc dust, until in 1918 the companies named below reported production, a part of which consisted of "atomized" zinc dust made by subjecting a small stream of molten zinc to a blast of air.

American Zinc & Chemical Co., Langeloth, Pa.
Anaconda Copper Mining Co., Great Falls, Mont.
Bartlesville Zinc Co., Bartlesville, Okla.
John Finn Metal Works, San Francisco, Calif.
Grasselli Chemical Co., Clarksburg and Meadowbrook, W. Va.
Illinois Zinc Co., Peru, Ill.
The Merrill Co., San Francisco, Calif.
Metals Disintegrating Co., New York, N. Y.
National Zinc Co., Bartlesville, Okla., and Springfield, Ill.
New Jersey Zinc Co., Palmerton, Pa.
United States Zinc Co., Pueblo, Colo.

The following table gives the output of zinc dust since its first production in a commercial way in the United States:

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Zinc dust produced in the United States and imported, 1910–1918.

Year.	Production.						Imports.		
	Prepared "blue powder."			Zinc dust "atomized."					
	Quantity (short tons).	Value.a	Average selling price per pound.	Quantity (short tons).	Value.a	Average selling price per pound.	Quantity (short tons).	Value.	Average selling price per pound.
1910	69	$9,246	$0.067	.....	.....	.....	1,493	$136,749	$0.046
1911	254	36,576	.072	.....	.....	.....	1,713	177,420	.052
1912	492	73,800	.075	.....	.....	.....	2,736	306,061	.056
1913	423	62,604	.074	.....	.....	.....	2,368	248,482	.052
1914	1,004	184,736	.092	.....	.....	.....	2,004	191,582	.048
1915	1,755	940,680	.268	.....	.....	.....	707	137,474	.097
1916	2,548	1,097,397	.215	61	$26,230	$0.215	522	230,380	.221
1917	3,989	1,322,196	.166	1,924	642,782	.167	233	48,604	.104
1918	4,016	877,171	.109	2,979	773,746	.130	16	3,552	.111

a Value is calculated from the total value of material sold during year.

ZINC PIGMENTS.

Zinc forms the base, either in whole or in part, of four white pigments—zinc oxide, leaded zinc oxide, zinc-lead oxide, and lithopone. All these may be and in the United States the first three usually have been made directly from zinc ore. No zinc-lead oxide has been made since 1909, when the plant at Canon City, Colo., was closed. The output of zinc oxide and leaded zinc oxide has not been disclosed, as it was confined to one very large producer and several smaller ones.

Lithopone is an intimate mixture by chemical precipitation of zinc sulphide and barium sulphate. It may be manufactured from zinc ore or zinc oxide, but in the United States it is generally made from zinc skimmings, zinc ashes, and scrap zinc. The production of lithopone is growing rapidly, as is shown in the following table:

Lithopone produced and marketed in the United States, 1906–1918, in short tons.

1906 (revised figures)	5,149	1913	29,685
1907	10,275	1914	32,819
1908	8,292	1915	46,494
1909	14,847	1916	51,291
1910	12,655	1917	63,713
1911	16,866	1918	62,403
1912	24,220		

The zinc content of the pigments made in the United States from ore, both domestic and foreign, for the period 1908–1918, is given in the table below. On page 1034 statistics of a portion of the secondary zinc recovered in the form of pigments are given.

Primary zinc content of zinc pigments made in the United States, 1908–1918, in short tons.

1908	48,004	1914	70,619
1909	54,139	1915	79,572
1910	50,592	1916	90,276
1911	46,122	1917	97,573
1912	64,032	1918	102,778
1913	70,622		

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SECONDARY ZINC.

By the ordinary method of galvanizing, in which the material to be coated is dipped into a bath of molten zinc, there is a great loss of zinc in the form of semioxidized skimmings and of hard zinc drosses, consisting of the alloy formed by the zinc with the iron of the tank and the iron of the article that is being galvanized. The larger galvanizing plants have furnaces to resmelt these skimmings and drosses and to recover the zinc. There are also many small plants and some large ones which make a practice of buying galvanizer's skimmings and drosses and of recovering the zinc. A considerable quantity of old metal in the form of various alloys of zinc with copper and other metals is also worked over and brought up to the desired composition by the addition of new metal. At almost every brass foundry and machine shop in the country it is the custom to remelt and use brass filings, grindings, and scrap copper and brass, and it is manifestly impracticable to attempt to take full account of such material. Some of the zinc smelters running on ore find it advantageous to work in a quantity of secondary material, because the loss of zinc in distillation is practically a fixed quantity per charge, whether the charge is of low or high tenor. If secondary material high in zinc is mixed with low-grade ore, the loss per unit of metal recovered is thereby greatly lessened. Where this is done the smelters make proper returns to the United States Geological Survey, and in these reports account has been taken of such production, the output being recorded as dross or secondary zinc. As such zinc has been recovered by redistillation, it is practically indistinguishable in quality from zinc of the usual grades made from ore. Several secondary smelters recover zinc from drosses by redistillation, and these plants are included in the list of smelters on a later page. In the table below the secondary zinc recovered by redistillation is separated from that recovered by remelting. The canvass of secondary smelters was made by J. P. Dunlop, of the United States Geological Survey.

Secondary zinc produced in the United States, 1913–1918, in short tons.

	1913	1914	1915	1916	1917	1918
Secondary zinc, redistilled	25,991	20,545	29,764	[a] 28,776	16,835	9,918
Secondary zinc, remelted	24,014	22,424	23,136	21,037	14,565	17,190
Recovered zinc in alloys, excluding old brass remelted	3,743	3,914	5,300	2,600	4,800	11,082
Recovered zinc in remelted brass	25,822	24,759	34,375	61,700	80,000	82,400
Secondary zinc recovered as metal	79,570	71,642	92,575	114,113	116,200	120,590
Secondary zinc recovered in pigment	3,705	6,536	8,323	8,749	9,204	8,675
Secondary zinc recovered in zinc chloride [b]	6,253	6,429	7,860	6,319	6,248	7,348
Total secondary zinc	89,528	84,607	108,758	129,181	132,000	137,000

[a] Revised figures. (See p. 1027.)
[b] These figures include only the quantity of zinc chloride used in wood preservation and were furnished by courtesy of the Forest Service, Department of Agriculture.

MINE PRODUCTION.

The preceding tables have given the quantity of zinc recovered either as metal by smelting and by electrolytic reduction, or in zinc dust, or as zinc in pigments. The three following tables show the

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origin of the domestic zinc that is recovered by metallurgic operations. For the origin of the zinc by States the reader must consult the mines reports, because smelters necessarily treat mixtures of ores, sometimes long after they have been received, so that the actual output of metallic zinc may not correspond at all closely to the product of the mines for the same year. The data for the tables of mine production are taken from the mines reports on gold, silver, copper, lead, and zinc in the different States, as indicated in the prefatory note.

The following table gives the zinc output since 1909. Missouri held first rank in mine production of zinc until 1918, but in that year she fell to fourth place and Oklahoma went into first place by virtue of her increasing output, which had practically doubled each year since 1915. New Jersey, which had so long held second place in zinc production, lost it to Montana in 1916 and 1918.

Mine production of zinc in the United States, 1909–1918, in short tons.

State.	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Arizona	2,989	2,742	2,281	4,379	4,714	4,896	9,110	9,839	10,447	1,135
Arkansas	510	994	664	748	478	608	3,209	6,815	6,691	951
California			1,404	2,173	529	195	6,547	7,628	5,436	2,781
Colorado	25,605	38,545	47,304	66,111	59,673	48,387	52,297	67,143	60,158	44,567
Idaho	676	2,802	4,170	6,953	11,587	21,006	35,077	43,253	39,927	22,581
Illinois	2,163	3,549	4,219	4,065	2,236	4,811	5,534	3,404	4,267	3,792
Iowa	35	96						21	18	
Kansas	11,445	13,229	10,272	10,633	10,088	11,284	14,365	12,448	20,249	30,197
Kentucky	56	6	158	491	327	230	764	1,096	751	315
Missouri	130,162	128,589	122,515	136,551	124,963	105,994	136,300	155,960	132,918	55,992
Montana	4,680	15,819	21,905	13,459	44,337	55,790	93,573	114,630	93,130	104,629
Nevada	1,507	1,354	1,774	6,661	7,210	6,490	12,188	16,222	11,154	8,362
New Hampshire					15	6	24	36	45	14
New Jersey[a]	83,248	68,584	66,027	76,283	79,070	82,956	117,722	112,020	120,846	98,470
New Mexico	6,543	9,044	5,119	6,783	8,262	9,202	12,702	18,285	15,100	12,025
New York			81				2,455	4,507	5,192	3,776
North Carolina				142	10					
Oklahoma	7,806	6,394	5,150	5,769	11,664	13,992	14,314	28,754	85,635	161,401
Tennessee	596	966	1,117	2,191	5,583	10,425	16,461	26,428	28,498	21,071
Texas				119	326	108	15	116	11	
Utah	4,930	8,184	8,920	8,534	9,429	7,995	12,146	14,786	10,643	9,200
Virginia	58	794	1,032	249	2,719	174	1,267	2,276	1,703	951
Washington			10				122	847	598	19
Wisconsin	23,152	25,927	29,720	33,050	30,110	31,113	41,403	56,803	59,742	50,014
	306,161	327,618	333,842	385,344	413,330	415,662	587,595	703,317	713,359	632,243

[a] The output of New Jersey for 1909–1915 has been revised and likewise the total for the whole country.

The following table shows for each zinc-producing State the total quantity of zinc ore produced and the recoverable zinc content of each kind of zinc-bearing ore. The column headed "All other ore" includes lead ore, copper ore, copper-lead ore, and dry or silliceous ore, no zinc of consequence being recovered from any of them except in California and Colorado. "Dry" ores produced in Colorado in 1918 contained 1,125 short tons of recoverable zinc. Copper-zinc ores produced in California contained 621 tons of recoverable zinc. These ores, however, were concentrated from parts of the ore from certain counties and were not distributed through the whole of the "All other ore" credited to those States in 1918. The total crude ore yielding either gold, silver, copper, lead, or zinc is given for each zinc-producing State, so that a comparison may be made of the relative extent of deep mining operations for all five metals in these States, the quantity of crude ore raised being the best measure for this

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purpose. The table discloses the fact that Missouri produced a little more than one-ninth of the crude ore output of the zinc-producing States, her production being 9,146,800 short tons of crude ore, of which 3,614,200 tons was zinc-lead ore. First in rank was Arizona, with 19,038,486 tons of crude ore, mainly copper; Utah ranked next, with 14,705,718 tons of crude ore, likewise mostly copper ore. Michigan, which formerly ranked second in quantity of crude ore raised, was third in 1918, with 11,321,365 tons.

The table gives also the quantity of recoverable zinc contained in the crude ores of each State in 1918 and the quantity of zinc recoverable from each kind of ore. The percentage of recoverable zinc contained in the zinc ore and the zinc-lead ore of each State is also shown. The recoverable zinc content of crude-zinc ore ranged from 36.5 per cent for a small quantity produced in Washington down to 2.5 per cent in Tennessee; the Western States show uniformly the higher percentages. The zinc-lead ore of Illinois averaged 1.3 per cent of recoverable zinc—the leanest average shown by zinc-bearing ore worked in 1918. The zinc-lead ore of Missouri, in prior years the leanest ore mined, averaged 1.5 per cent of recoverable zinc in 1918. The average recoverable zinc content of the zinc ore of the United States in 1918 was 9.5 per cent, and of the zinc-lead ore was 3.1 per cent. Of the total mine production of zinc in 1918, a quantity corresponding to 23.5 per cent was derived from zinc ore, 76.2 per cent from zinc-lead ore, and 0.3 per cent from all other ores.

Mine production of zinc in the United States in 1918, by States and kinds of ore, in short tons.

State.	Zinc ore.			Zinc-lead ore.			All other ore.		Total.	
	Crude ore.	Recoverable zinc content.		Crude ore.	Recoverable zinc content.		Crude ore.	Recoverable zinc content.	Crude ore.	Recoverable zinc content.
		Quantity.	Percentage.		Quantity.	Percentage.				
Arizona	2,129	635	29.8	13,043	500	3.8	19,023,314	.....	19,038,486	1,135
Arkansas	37,000	951	2.6	.....	.....	.....	.....	.....	37,000	951
California	17,349	2,160	12.5	.....	.....	.....	2,486,062	621	2,503,411	2,781
Colorado	60,350	11,083	18.4	291,196	32,359	11.1	1,963,344	1,125	2,314,890	44,567
Idaho	5,506	1,919	34.9	490,917	20,662	4.2	1,595,196	.....	2,091,619	22,581
Illinois	.....	.....	.....	280,900	3,792	1.3	(a)	.....	a280,900	3,792
Kansas	.....	.....	.....	1,025,400	30,197	2.9	.....	.....	1,025,400	30,197
Kentucky	b 9,000	315	3.5	.....	.....	.....	(a)	.....	b9,000	315
Missouri	.....	.....	.....	3,614,200	55,918	1.5	5,532,600	74	9,146,800	55,992
Montana	1,873	100	5.3	1,090,955	104,529	9.6	6,731,139	.....	7,823,967	104,629
Nevada	10,977	3,428	31.2	23,240	4,934	21.2	6,438,356	.....	6,472,579	8,362
New Hampshire	.....	.....	.....	75	14	18.7	.....	.....	75	14
New Jersey	672,791	98,470	14.6	.....	.....	.....	.....	.....	672,791	98,470
New Mexico	110,213	9,777	8.9	13,933	2,248	16.1	4,625,638	.....	4,749,784	12,025
New York	40,850	3,776	9.2	.....	.....	.....	43	.....	40,893	3,776
Oklahoma	.....	.....	.....	5,754,700	161,401	2.8	.....	.....	5,754,700	161,401
Tennessee	598,742	15,234	2.5	32,217	5,837	18.1	529,012	.....	1,159,971	21,071
Utah	1,849	511	27.6	428,985	8,689	2.0	14,274,884	.....	14,705,718	9,200
Virginia	.....	.....	.....	25,908	951	3.7	.....	.....	25,908	951
Washington	52	19	36.5	.....	.....	.....	138,859	.....	138,911	19
Wisconsin	.....	.....	.....	2,377,300	50,014	2.1	.....	.....	2,377,300	50,014
	1,568,681	148,378	9.5	15,462,975	482,045	3.1	63,338,447	1,820	80,370,103	632,243
Percentage of total zinc derived from each kind of ore	.....	23.5	.....	.....	76.2	.....	.....	0.3	.....	100.0

a Exclusive of fluorspar ore. b Estimated.

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Districts in the United States producing more than 1,000 short tons of recoverable zinc in 1918.

District.	State.	Crude zinc-bearing ore sold or treated (short tons).	Shipping ore and concentrates (short tons).					Total recoverable zinc content (short tons).	Percentage of total production.
			Total quantity.	Sulphides.		Carbonates and silicates.			
				Quantity.	Recoverable zinc content.	Quantity.	Recoverable zinc content.		
1. Joplin	Missouri	3,614,200	113,123	95,542	50,058	17,581	5,860	55,918	8.8
	Kansas	1,025,400	55,979	55,979	30,197			30,197	4.8
	Oklahoma	5,754,700	300,727	300,702	161,393	25	8	161,401	25.5
		10,394,300	469,829	452,223	241,648	17,606	5,868	247,516	39.1
2. Butte	Montana	998,729	291,088	291,088	102,482			102,482	16.2
3. Franklin Furnace	New Jersey	672,791	533,553			533,553	98,470	98,470	15.6
4. Upper Mississippi Valley	Wisconsin	2,377,300	180,554	175,339	48,856	5,215	1,158	50,014	7.9
	Illinois	280,900	13,128	13,128	3,792			3,792	.6
		2,658,200	193,682	188,467	52,648	5,215	1,158	53,806	8.5
5. Leadville	Colorado	140,573	86,501	65,209	20,167	21,292	3,175	23,342	3.7
6. Coeur d'Alene	Idaho	485,871	56,649	56,649	21,831			21,831	3.5
7. East Tennessee	Tennessee	630,959	49,126	28,791	15,221	20,345	5,850	21,071	3.3
8. Red Cliff and Breckenridge	Colorado	114,268	58,584	58,584	15,271			15,271	2.4
9. Yellow Pine	Nevada	28,688	27,007	6,519	1,892	20,488	5,830	7,722	1.2
10. New Mexico[a]	New Mexico	80,523	21,664	19,841	5,565	1,823	366	5,920	.9
11. Magdalena	do	42,081	25,729	18,387	4,049	7,342	1,701	5,750	.9
12. Bingham and Smelter	Utah	347,275	19,588	19,588	5,580			5,580	.9
13. Edwards	New York	40,850	9,066	9,066	3,776			3,776	.6
14. Park City	Utah	47,776	4,764	4,764	1,715			1,715	.3
15. Eureka	Colorado	62,463	5,011	5,011	1,705			1,705	.3
16. Shasta County	California	92,693	16,855	16,855	1,523			1,523	.2
17. San Francisco	Utah	33,112	3,505	3,505	1,257			1,257	.2
18. Inyo County	California	14,526	5,138			5,138	1,256	1,256	.2
19. Cataract	Montana	28,482	4,497	4,497	1,232			1,232	.2
		16,920,160	1,851,846	1,249,044	497,552	632,802	123,673	621,225	98.2
All other districts								11,018	1.8
Total for United States								632,243	100.0

[a] Central and Pinos Altos.

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The districts listed in the preceding table are outlined with little heed to the artificial restrictions of political boundaries and may include parts of adjacent States. The table has been compiled to show the production of zinc in the principal districts so that they may be compared as to extent of zinc mining operations, as shown by the output of crude ore; as to character of ores, whether sulphide or oxidized; and, finally, as to relative rank as zinc producers.

COMPARISON OF PRODUCTION BASED ON SMELTER AND ON MINE REPORTS.

The figures of the smelter production of domestic primary zinc are given in the foregoing pages. The mine figures are the totals for all the States as given in part on page 1035. In order to put the smelter figures on a basis comparable with the mine figures, all the zinc manufactured into pigments directly from domestic ore is added to the metallic zinc produced. The zinc content of zinc dust ("blue powder") and of such "atomized" zinc dust as is made from metallic zinc not already taken into statistical account is also included with the metallic zinc. The zinc recovered from secondary sources is excluded, for it has already been once reckoned as zinc. Likewise the zinc in zinc oxide made from metallic zinc and the zinc content of "atomized" zinc dust made from metallic zinc already counted have been left out, as their inclusion would entail a duplication to that extent. These facts must be borne in mind in comparing the smelter totals of the subjoined table with previous tables showing the smelter production of zinc.

In compiling the mine totals each producing mine operator is requested to report actual quantity of zinc ores and concentrates shipped, and from these returns the zinc content is reckoned by assay value. From that zinc content 10 to 20 per cent, according to the character of the ore, is deducted for smelting losses, and the sum of the remainders thus obtained from all the producing properties in each State gives the total recoverable zinc for the State. Where the ore is concentrated at a custom mill, proper allowance is also made for the loss of metal in the process unless the concentrate itself has been reported.

It is clear that by either method the correctness of the totals is dependent upon complete and correct returns from each producing mine and smelter. It is essential that the smelter operator give correctly the production from domestic ore as distinguished from that made from foreign ore. It is essential to the correctness of the mine totals that the assay content and the theoretical recovery be correctly estimated. The totals, as compiled from smelter reports and from mine reports, respectively, should be in reasonable agreement. As a matter of fact, for any year they show considerable divergence. These discrepancies, recorded as "smelter excess" or "mine excess," may be the result of one cause or of a combination of causes, among which are lag in the smelting of the ore, resulting in accumulation of ore stocks at the smelters; lag in the mining, or extraordinary demand for metal, owing to which the smelter depletes its ore stocks; and error in calculating metallic content from assay and in estimating recovery.

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By referring to the table comparing the mine and smelter totals it will be seen that mine excesses are more frequent than smelter excesses and that the total reported mine production of recoverable zinc for 1907–1918, inclusive, exceeds the total smelter recovery by 194,589 tons, or 3.8 per cent. This may indicate that the allowance for losses in treatment has not been large enough, but there are other possible explanations. The average zinc smelter of 1918, though the number was nearly the same as in 1908, was nearly twice as large as the average zinc smelter of 1908 and required correspondingly larger ore stocks on hand. Moreover, the number and size of zinc oxide plants has doubled in the same period, likewise requiring larger stocks of ore on hand. Furthermore, lithopone and zinc salts, formerly made from zinc ashes and other secondary material, are now made in part from zinc ore and require their proper ore stocks. It is probable that considerable quantities of zinc salts have in previous years been made from zinc ores, without statistical account being taken of the zinc so recovered. All these factors would tend to swell the total mine excess.

Domestic zinc produced by smelters and by mines, 1907–1918, in short tons.

Year.	Totals compiled from smelter reports.	Totals compiled from mine reports.	Smelter excess.	Mine excess.
1907	280,676	259,951	20,725	.....
1908	238,030	234,526	3,504	.....
1909	283,173	a 306,161	.....	22,988
1910	303,139	a 327,618	.....	24,479
1911	315,029	a 333,842	.....	18,813
1912	386,783	a 385,344	1,439	.....
1913	408,289	a 413,330	.....	5,041
1914	424,672	a 415,662	9,010	.....
1915	539,074	a 587,595	.....	48,521
1916	a 656,875	703,317	.....	46,442
1917	a 684,872	713,359	.....	28,487
1918	597,747	632,243	.....	34,496
	5,118,359	5,312,948	.....	194,589

a Revised figures.

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ZINC-REDUCTION PLANTS.

ELECTROLYTIC PLANTS.

Electrolytic zinc plants in the United States and Canada at the end of 1918.

[Exp., experimental work; Op., commercial operation.]

Company.	Location of plant.	Present daily capacity.	Development of industry.					
			1913	1914	1915	1916	1917	1918
UNITED STATES.								
American Smelting & Refining Co.	Murray, Utah	Nominal	.....	.....	.....	Exp.	(a)	(b)
Do.	Omaha, Nebr	...do...	.....	.....	Exp.	(b)	.....	.....
Anaconda Copper Mining Co.	Anaconda, Mont.	25 tons.	.....	Exp.	Op.	Op.	(a)	(a)
Do.	Great Falls, Mont.	150 tons.	.....	.....	.....	Op.	Op.	Op.
Basin Railways Co.	Basin, Mont.	Nominal	.....	.....	.....	.....	Exp.	(b)
Bully Hill Copper Co.	Bully Hill, Calif.	...do...	.....	.....	Exp.	Exp.	(a)	(a)
Bunker Electrolytic Zinc Syndicate.	Martinez, Calif.	...do...	.....	.....	.....	.....	.....	Exp.
Ducktown Copper, Sulphur & Iron Co. (Ltd.).	Isabella, Tenn.	1 ton.	.....	.....	.....	.....	Exp.	(a)
Electrolytic Zinc Co.	Baltimore, Md.	10 tons.	.....	.....	.....	Op.	Op.	Op.
Illinois Zinc Co.	Peru, Ill.	Nominal	.....	.....	.....	.....	.....	.....
Judge Mining & Smelting Co.	Park City, Utah.	15 tons.	.....	.....	.....	.....	Op.	Op.
Mountain Copper Mining Co.	Kennett, Calif.	25 tons.	.....	.....	.....	.....	Op.	Op.
Reed Zinc Co.	Palo Alto, Calif.	Nominal	Exp.	Exp.	Exp.	(b)	.....	.....
River Smelting & Refining Co.	Keokuk, Iowa.	10 tons.	.....	Exp.	Exp.	Op.	Op.	Op.
Western Chemical Manufacturing Co.	Denver, Colo.	...do...	.....	.....	.....	.....	.....	Exp.
CANADA.								
Consolidated Mining & Smelting Co. (Ltd.).	Trail, British Columbia.	50 tons.	Exp.	Exp.	Op.	Op.	Op.	Op.
Zinc Co. (Ltd.).	Shawinigan Falls, Quebec.	5 tons.	.....	.....	Exp.	Exp.	Op.	(a)
French Complex Ore Reduction Co.	Frank, British Columbia.	Nominal	.....	.....	Exp.	Exp.	Exp.	(a)

a Idle. b Dismantled.

The output of electrolytic zinc in the United States in 1918 was 39,669 short tons, of which 38,916 tons was made from ore and 753 tons was refined from prime western metal. The output in 1917 was 26,910 tons, of which 25,209 tons was made from ore and 1,701 tons was refined from prime western metal.

The output in Canada in 1918 is shown in the table of the world's production of zinc, given on page 1061. All zinc produced in Canada is recovered by the electrolytic process.

ZINC SMELTERS.

The following table gives the zinc-smelting capacity of the United States from December 31, 1913, to December 31, 1918. This is included because of its historical value. In conjunction with the list of electrolytic zinc plants it shows in detail how the zinc-smelting industry met the extraordinary demands of the World War and how after those demands ceased it was deflated to meet the needs of reconstruction.

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Zinc smelters in the United States, 1913–1918.[a]

Plants with ordinary retorts.

Operating company. (A—acid plant; not necessarily at the smelter.)	Location.	Retorts at end of 1913.	Retorts at end of 1914.	Retorts June 30, 1915.	Retorts at end of 1915.	Retorts June 30, 1916.	Retorts at end of 1916.	Retorts June 30, 1917.	Retorts at end of 1917.	Retorts June 30, 1918.	Retorts at end of 1918.
ARKANSAS.											
Arkansas Zinc & Smelting Corporation	Van Buren					2,400	3,200	3,200	3,200	3,200	3,200
Athletic Mining & Smelting Co.	Fort Smith							1,664	2,496	2,496	2,496
Fort Smith Spelter Co.	do.					2,560	2,560	2,560	2,560	2,560	2,560
						4,960	5,760	7,424	8,256	8,256	8,256
COLORADO.											
United States Zinc Co.	Pueblo	1,920	1,920	2,240	2,208	1,944	1,984	2,200	1,968	2,208	2,208
ILLINOIS.											
American Zinc Co. of Illinois (A)	Hillsboro	3,200	4,000	4,000	4,000	4,864	4,864	4,864	4,864	4,864	4,864
Collinsville Zinc Smelter	Collinsville	1,536	1,536	1,536	1,792	2,304	2,304	2,300	2,304	(b)	
Eagle-Picher Lead Co. (A)	Hillsboro	1,840	1,840	1,840	1,840	3,200	3,200	3,200	3,200	3,200	3,200
Granby Mining & Smelting Co. (A)	East St. Louis			1,620	3,220	3,220	4,820	5,620	5,620	5,620	5,620
Hegeler Zinc Co. (A)	Danville	1,900	1,800	3,600	3,600	5,400	5,400	5,400	5,400	5,400	5,400
Illinois Zinc Co. (A)	Peru	4,640	4,640	4,640	4,640	4,640	4,640	5,440	5,440	5,520	5,520
Matthiessen & Hegeler Zinc Co. (A)	La Salle	5,256	5,256	6,168	6,168	6,168	6,168	6,168	6,168	6,168	6,168
Missouri Zinc Co.	Beckemeyer	192	192	192	352	352	352	302	352	352	352
Mineral Point Zinc Co. (A)	Depue	6,800	9,080	9,088	9,088	9,088	9,088	9,088	9,088	9,088	9,088
National Zinc Co. (A)	Springfield	3,200	3,200	3,200	3,200	4,480	4,480	4,480	4,480	4,480	4,480
Sandoval Zinc Co.	Sandoval	996	996		672	672	672	672	672	672	672
		29,460	32,540	35,984	38,552	44,368	45,968	47,514	47,568	45,344	45,344
INDIANA.											
Grasselli Chemical Co. (A)	Terre Haute								3,360	4,200	4,200
KANSAS.											
American Spelter Co.	Pittsburg				896	992	992	992	992	(c)	
American Zinc, Lead & Smelting Co.	Caney	3,648	3,648	4,596	6,080	6,080	6,080	6,080	6,080	6,080	4,352
Do.	Dearing	3,840	3,840	4,480	4,480	4,480	4,480	4,480	4,480	(c)	
Chanute Spelter Co.	Chanute	1,280	1,280	1,280	1,280	1,280	1,280	1,280	(c)		
Cherokee Smelting Co.	Bruce			896	896	896	896	896	896	(c)	

[a] Includes distillation plants working on ore alone, on ore and drosses, and on drosses alone. [b] Idle. [c] Dismantled.

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Zinc smelters in the United States, 1913–1918—Continued.

Plants with ordinary retorts—Continued.

Operating company. (A—acid plant; not necessarily at the smelter.)	Location.	Retorts at end of 1913.	Retorts at end of 1914.	Retorts June 30, 1915.	Retorts at end of 1915.	Retorts June 30, 1916.	Retorts at end of 1916.	Retorts June 30, 1917.	Retorts at end of 1917.	Retorts June 30, 1918.	Retorts at end of 1918.
KANSAS—continued.											
Edgar Zinc Co	Cherryvale	4,800	4,800	4,800	4,800	4,800	4,800	5,040	5,040	5,040	4,984
Granby Mining & Smelting Co	Neodesha	3,760	3,760	3,760	3,760	3,760	3,760	3,760	3,760	(a)	.....
Lanyon Zinc Co	Concrete	.....	.....	.....	660	1,320	1,320	1,320	(a)	.....	.....
Mahoning Ore & Spelter Corporation	Pittsburg	.....	.....	1,120	1,444	1,792	1,792	1,992	1,992	(a)	.....
Do	do	.....	.....	.....	448	448	448	448	448	(a)	.....
Owen Zinc Co	Caney	.....	.....	.....	1,280	1,280	1,920	1,920	1,920	1,920	(b)
Pittsburg Zinc Co	Pittsburg	910	910	896	910	910	910	910	910	(b)	.....
Prime Western Spelter Co	Iola	2,598	2,598	2,698	2,698	2,698	2,698	2,696	2,696	1,972	2,320
Do. (A)	Gas	2,170	2,170	2,170	2,170	2,170	2,170	2,170	2,170	(a)	.....
United States Smelting Co	Altoona	3,960	3,960	3,960	3,960	4,600	4,600	4,600	(a)	.....	.....
Do	Iola	.....	.....	1,400	3,440	3,440	3,440	3,440	3,440	(a)	.....
Do	La Harpe	1,856	1,856	.....	1,924	1,924	1,926	1,926	(a)	.....	.....
Weir Smelting Co	Weir	.....	.....	.....	.....	.....	288	448	448	(b)	.....
		28,822	28,822	32,056	41,126	42,870	43,800	44,398	35,272	15,012	11,656
MISSOURI.											
Edgar Zinc Co	St. Louis	2,000	1,100	2,000	2,000	2,000	2,000	1,982	1,982	1,982	(a)
Missouri Zinc Smelting Co	Rich Hill	.....	.....	.....	.....	448	448	448	448	(b)	.....
Nevada Smelting Co	Nevada	672	.....	.....	672	672	672	672	672	(b)	.....
		2,672	1,100	2,000	2,672	3,120	3,120	3,102	3,102	1,982	.....
OKLAHOMA.											
Bartlesville Zinc Co	Bartlesville	5,184	5,184	5,184	5,184	6,336	6,336	6,336	6,336	5,184	5,184
Do	Blackwell	.....	.....	.....	.....	1,600	9,600	9,600	9,600	9,600	9,600
Do	Collinsville	8,064	8,064	8,064	10,752	13,440	13,440	13,440	13,440	(a)	.....
Bartlesville Zinc Co. (Lanyon-Starr plant)	Bartlesville	3,456	3,456	3,456	3,456	3,456	3,456	3,456	3,456	3,456	3,456
Eagle-Picher Lead Co	Henryetta	.....	.....	.....	.....	.....	4,000	4,000	4,000	4,000	4,000
Kusa Spelter Co	Kusa	.....	.....	.....	3,720	7,720	7,720	7,720	7,720	5,600	5,360
National Zinc Co	Bartlesville	4,480	4,266	4,970	4,970	4,970	4,970	4,970	4,970	4,236	4,160
Oklahoma Spelter Co	Kusa	.....	.....	.....	.....	1,600	1,600	1,600	1,600	(b)	.....
Quinton Spelter Co	Quinton	.....	.....	.....	.....	.....	1,344	2,016	2,016	2,016	2,016
Tulsa Fuel & Manufacturing Co	Collinsville	6,232	6,232	6,232	6,232	6,232	6,232	6,232	6,232	6,232	6,232
United States Smelting Co	Checotah	.....	.....	.....	.....	2,560	5,120	5,120	5,120	5,120	5,120
United States Zinc Co	Sand Springs	.....	2,400	4,800	5,690	8,000	8,000	10,992	8,000	8,360	5,936

Chevron U.S.A. Inc.

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Victory Metal Co.	Henrietta					3,000	3,000	3,000	3,000	3,000	3,000
Western Spelter Co.	do						2,400		2,648	2,648	3,209
		27,416	29,596	32,706	39,994	58,914	77,218	78,482	78,138	59,472	57,264
PENNSYLVANIA.											
American Steel & Wire Co. (A)	Donora				3,648	9,120	9,120	9,120	9,120	9,120	9,120
American Zinc & Chemical Co. (A)	Langeloth		880	3,648	3,648	6,384	7,296	7,296	7,296	7,296	7,296
New Jersey Zinc Co. (of Pennsylvania)	Palmerton	5,760	5,760	6,720	6,720	6,960	7,200	7,200	7,200	7,200	7,192
		5,760	6,640	10,368	14,016	22,464	23,616	23,616	23,616	23,616	23,608
WEST VIRGINIA.											
Clarksburg Zinc Co.	Clarksburg	2,736	1,824	2,736	3,648	3,648	3,648	3,648	3,648	(b)	
Grasselli Chemical Co. (A)	do	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760
Do	Meadowbrook	6,912	6,912	6,912	8,592	8,592	8,544	8,544	8,544	8,520	8,520
United Zinc Smelting Corporation (A)	Moundsville								1,728	1,728	1,728
		15,408	14,496	15,408	18,000	18,000	17,952	17,952	19,680	16,008	16,008
Total retorts		111,458	115,114	130,642	156,568	196,640	219,418	224,778	220,950	176,088	168,544
Retorts in operation		85,000	94,500	129,000	155,000	177,500	204,500	189,500	132,750	107,500	123,500
Plants with large retorts.[c]											
Eastern Zinc Refining Co.	Brooklyn, N. Y.						8		16		16
John Finn Metal Works	San Francisco, Calif.						2		2		12
Michael Hayman & Co.	Buffalo, N. Y.	12	12		12		12		12		12
M. M. S. Metal Co.	Trenton, N. J.						21		21		(a)
Trenton Smelting & Refining Co.	do	40	40		96		96		60		80
William Cramp & Sons Ship & Engine Building Co.	Philadelphia, Pa.	24	24		32		32		32		(a)
Joseph G. Kessler & Co.	Brooklyn, N. Y.										8
		76	76		140		171		143		128

a Dismantled. b Idle. c Large graphite retorts, yielding 600–800 pounds of zinc per charge.

NOTE.—The Grasselli Chemical Co. operates acid plants in connection with its zinc-roasting furnaces at Terre Haute and Grasselli, Ind.; Cleveland, Canton, and Lockland (near Cincinnati), Ohio; and Newcastle, Pa., and smelts the roasted zinc concentrates at the smelters at Terre Haute, Ind., and Clarksburg and Meadowbrook, W. Va. The Prime Western Spelter Co. operates roasting furnaces and an acid plant at Tiltonsville, Ohio. The National Zinc Co. has roasting furnaces and an acid plant at Argentine, Kans.

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The foregoing lists include a few retort smelters that treat only secondary materials, such as zinc ashes, skimmings, and galvanizers' drosses; also a few that recover about equal quantities of zinc from ores and from secondary materials, as well as several more that treat minor quantities of secondary materials. Several other zinc-smelting plants in the country obtain zinc by the distillation of zinc ashes and drosses in large graphite crucibles and condensers somewhat similar to those used in the Faber du Faur furnaces for recovering zinc from the zinc crusts in lead desilverization. These are given at the bottom of the list.

ZINC-SMELTING CAPACITY AND CHANGES IN 1918.

The number of retorts at zinc smelters at the end of 1918 was 168,544. There were no additional retorts under construction; in fact, at several smelters it was intended to discontinue operations after the end of the year. This did not involve dismantling the plants, however. The number of retorts in operation was 123,500 at 36 plants compared with 107,500 retorts in operation at the middle of 1918 and with 132,750 retorts in operation at 54 plants at the beginning of 1918.

THE ZINC INDUSTRY AND THE WORLD WAR.

Below is given a brief account of the war's demands upon the zinc industry and of the ways in which the industry met these demands. From the American's point of view the war is naturally divided into two periods—that before the United States became involved as an ally and that afterward.

FIRST PERIOD.

In the first period the part of this country was to furnish the greatly increased supplies of zinc demanded for war uses by the Allies. This burden fell upon the United States because of the fact that of the three main zinc-smelting centers in Europe two were in Germany and the other was along Meuse River in the line of the German advance through Belgium and northern France.

The demand for zinc made itself felt immediately after the war broke out, and exports of zinc for the last five months of 1914 reached unprecedented quantities; yet the price did not reflect this demand, because very large smelter stocks were on hand at the middle of the year—about 65,000 tons—almost equal to the exports for the last half of the year. As a result, after the preliminary upward flurry at the beginning of the war, the price dropped in October, 1914, to the lowest point of the whole war period, 4.6 cents a pound. The great demand continued, however, and after the stocks were exhausted the price rose rapidly to the highest point of the war, reaching 26.5 cents a pound for prime western zinc early in June, 1915. The rising prices had encouraged such a fever of new zinc-smelter building and of enlarging and rebuilding old plants that in the first half of 1916 the smelter capacity and production had overtaken the consumption and stocks had begun to accumulate. One reason for the culmination of the extremely high prices in 1915 was that the different

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Allies bought their munitions individually in the United States and naturally came into competition and thus bid the prices up on one another. In January, 1915, the British Government appointed J. P. Morgan & Co. as purchasing agents for copper, zinc, brass, and other munitions exclusive of pig lead, and in May of the same year the French Government did likewise. The stopping of active competition between these two of the largest buyers of zinc as metal and in munitions was followed by a sharp decline in prices, beginning in the last half of June and eventually in August reaching 11 cents a pound. Afterward, however, the temporary scarcity of zinc, owing to greater war demands, carried the price up to slightly over 19 cents a pound in February, 1916. At this point the accumulation of zinc stocks made itself felt, and zinc dropped to 8.8 cents a pound and has never since, except for two periods of a month or so each, commanded more than 10 cents a pound.

The Geological Survey's new-year, mid-year, advance, and annual statements of zinc production were published as usual during this period, but they were considerably more detailed than previous statements. A statement published in August, 1914, discussed the general zinc situation as affected by the war, giving the prewar exports of zinc and galvanized iron from Germany, Belgium, France, and Great Britain, and the imports of zinc and galvanized iron into South America, and pointing out that the war, by tying up the European zinc centers, offered the United States a chance to enter the zinc markets of the world. In April, 1915, the resources, production, and consumption of zinc were discussed and the conclusion reached that the zinc resources, smelting capacity, and production of the United States were fully equal to any probable demand. In April, 1916, attention was called to the great increase in smelting capacity and to the danger of overbuilding. However, smelter building continued apace until on June 30, 1917, there were 224,778 ordinary retorts in this country, in addition to the large retorts working on secondary materials and to the electrolytic plants. In 1916 and 1917 the maximum production of zinc was recorded. The story thereafter is one of declining prices and the closing and dismantling of plants.

SECOND PERIOD.

WORK OF ORGANIZATIONS.

During the first period the high prices and great demand for zinc, especially for the higher grades, had stimulated smelter building so that by the time the United States entered the war the capacity was more than equal to any demand that was likely to be made upon it. However, zinc was naturally dealt with as the other metals entering into munitions, and committees, including representative zinc producers, cooperated with the Government war boards and commissions, not that production might be stimulated but that wasteful overproduction might be avoided and that zinc might be substituted where possible for other needed but scarcer metals. The Joint Information Board, composed of representatives of the Government bureaus and the war boards and commissions, maintained the contact between them necessary to prevent duplication of effort

and loss of time. Excerpts and summaries of the reports of the zinc producers' committees and the War Industries Board are given on pages 1049–1052.

UNITED STATES GEOLOGICAL SURVEY.

During the second period the United States Geological Survey collected weekly by wire statistics of the production, stocks, and commitments of zinc in the different grades and furnished them to the War Industries Board. This service was begun in November, 1917, and continued until the end of the war. Permission of producers to publish the weekly totals of production and stocks by grades was obtained, and these reports were distributed to the press, beginning with the week ending July 26, 1918. Quarterly reports of zinc production had been published during the last half of 1917 and were continued through 1918.

In requesting permission to publish the weekly reports it was urged upon the zinc producers that the weekly publication of production and stocks by grades would tend to stabilize prices and production by putting the status of the zinc industry clearly before producer and consumer each week. As the Government was the chief consumer and as these reports had already been made to the Government for more than eight months, it was urged that any advantage which consumers would gain would be more than offset by the advantage gained by the producer. The effect of the publication of these figures may be seen from the accompanying curves (fig. 18), showing the weekly production and stocks of each grade for the period for which they were collected. Any stabilizing effect, of course, would be manifested only after publication was begun at the end of July. The excess of supply over production for all grades except grade A is shown graphically. The limitation of output of grade D zinc through the second and third quarters of 1918, which accomplished the remarkable reduction in stocks, is likewise shown, together with the correlated rise in price. To a certain extent the same is true of grade C zinc. In the early part of 1918 the output and weekly stocks of grade A metal were small, but later, through increase of redistillation and electrolytic plants, the output increased and the stocks were materially augmented. After the armistice was declared the demand for zinc lessened and the output of grades C and D was somewhat larger, resulting in increase of stocks and declining prices for zinc. The chart brings out in a striking way the enormous visible zinc supplies in the early part of 1918 and also in the early part of 1919. Publication of the weekly statistics was urged under the plea that such data would be essential to proper measures for reorganization and reconstruction of the zinc industry. Several smelters refused to carry longer the burden of weekly reports, however, and publication was discontinued with the issue of January 25, 1919. Figures were nevertheless collected for the weeks ending February 22 and March 22 for the use at conferences of the zinc producers' committee and the director of sales, purchase, storage, and traffic division of the War Department called to consider the question of disposal of Government surplus zinc. The statistics for these weeks do not include Government-owned stocks at smelters, amounting to approximately 10,000 tons. If this zinc is added to

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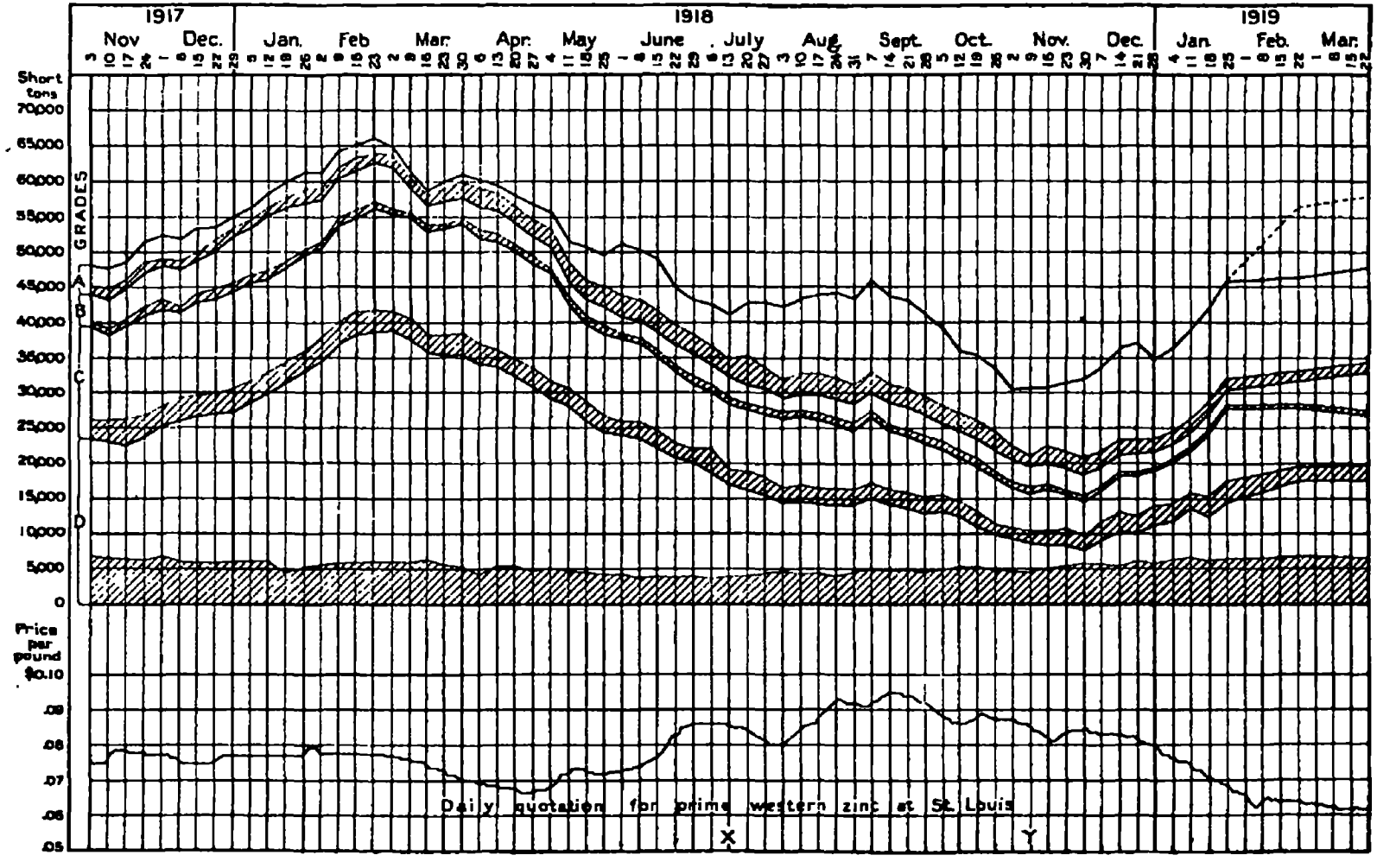

FIGURE 18.—Curves showing the weekly production and stocks of zinc by grades with daily market quotations for prime western zinc at St. Louis, November, 1917, to March, 1919. The whole space between the heavy lines represents stocks of zinc by grades as lettered at the end of the week. The upper solid line therefore represents the total supply of zinc at smelters at the week ends. The shaded areas represent weekly production of zinc by grades. The broken line shown in February and March, 1919, represents the addition of stocks of Government-owned zinc not reported by smelters for those weeks. "X" shows beginning of publication of weekly reports of production and stocks, and "Y" shows the signing of the armistice.

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that given it will be seen that stocks increased nearly 3,000 tons a week from December 28, 1918, to March 22, 1919. The Government-owned stocks are shown by the broken line at the top of the curve for February and March, 1919.

WAR SERVICE COMMITTEES ON ZINC.

The following notes on the services of the committees on zinc formed at the instance of the Council of National Defense are summarized from a history of the committees by Edgar Palmer, chairman, made to the historical division of the General Staff, United States Army.

ADVISORY COMMITTEE ON ZINC.

In the later part of March, 1917, shortly before the United States entered the war, Bernard Baruch, chairman of the committee on raw materials, minerals, and metals of the Council of National Defense, asked Edgar Palmer, president of the New Jersey Zinc Co., to accept the chairmanship of the advisory committee on zinc. After the official notification and acceptance of the chairmanship on April 21, 1917, the following additional members of the committee were appointed by Mr. Baruch:

Charles W. Baker, American Zinc, Lead & Smelting Co.
Sidney J. Jennings, United States Smelting, Refining & Mining Co.
Thomas F. Noon, Illinois Zinc Co.
N. Bruce MacKelvie, Butte & Superior Mining Co.
Charles T. Orr, Bertha A. Mining Co.
Cornelius F. Kelley, Anaconda Copper Mining Co.
A. P. Cobb (secretary), New Jersey Zinc Co.

Among the first duties of the committee were to ascertain the immediate needs for zinc and to obtain an estimate of the future requirements. As the purchases of zinc involved many bureaus, boards, producers, and consignees, a scheme governing the placement, billing, and allocation of shipments was devised, known as the routine flow sheet, through which, by means of a checking system of manifold filing of orders, acknowledgments, and shipping directions with all parties concerned, business was simplified and all were kept in touch with the progress made on each order.

About the middle of April the Government was in urgent need of about 10,000 tons of grade A and grade B zinc, and a few hundred tons of grade C zinc. Through the committee this was furnished at 11½ cents a pound for grade A, 11 cents a pound for grade B, and 9 cents a pound for grade C, although grade A zinc was then selling in open market for 25 cents a pound and the other grades in proportion.

The announcement of this first purchase of zinc through the committee resulted shortly in published rumors that the price of grade C zinc had been fixed at 9 cents a pound. As this is the grade of zinc most largely produced from Joplin concentrates, which yield approximately 40 per cent of the zinc output of the country, and as the price of 9 cents was admittedly below the cost of producing metal from Joplin concentrates at the then current price of $85 a ton, it was urged that the price of Joplin concentrates would necessarily be reduced, resulting in curtailment of production in that important district.

Furthermore, a number of producers had refused to offer to furnish any part of the first requirement of 10,000 tons because the prices fixed were alleged to be below the current costs of production. Therefore the committee proposed a new schedule of prices, for June-September delivery, based on Joplin concentrates at $85, as follows: Grade A, 15 cents; grade B, 14 cents; brass special, 13 cents; and grade C, 12 cents—these prices being urged in order to maintain a maximum output of Joplin concentrates.

The Government through the War and Navy Departments having made objection to these prices, a temporary schedule was arranged in order that supplies might go forward, final adjustments to be made later. These temporary prices were: Grade A, 13½ cents; grade B, 13 cents; grade C, 8½ to 9 cents. In August the committee was asked to obtain for the Navy Department and the Emergency Fleet Corporation 5,000 tons of grade A zinc at 12½ cents and 1,375 tons of grade B zinc at 12 cents. In September this request was countermanded and the zinc was obtained by the organizations concerned in the regular way by asking for bids.

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In June, 1917, the committee asked for offers to supply about 2,000 tons of zinc sheets at 16 cents and several hundred tons of zinc plates at 15 cents. In July the Navy Department asked for an additional 2,500 tons of plates at 14 cents. On the representation of producers that this would be unremunerative, the price was set at 15 cents.

After the passage of the food and fuel control act in August, 1917, the committee on zinc resigned, because that act prohibited those who sold material to the Government from serving on such committees.

ZINC PRODUCERS' COMMITTEE.

In November, 1917, the War Industries Board suggested the formation of a zinc producers' committee to act in an intermediary capacity between the producers and the War Industries Board. The following persons were named:

Edgar Palmer (chairman), New Jersey Zinc Co.
C. M. Loeb, American Metal Co.
C. F. Kelley, Anaconda Copper Mining Co.
Sidney J. Jennings, United States Smelting Co.
E. W. Furst, Grasselli Chemical Co.
W. A. Ogg, American Zinc, Lead & Smelting Co.
S. M. Evans, Eagle-Picher Lead Co.
J. D. Layng, jr., Illinois Zinc Co.
W. W. Vick, Henryetta Spelter Co.
N. B. MacKelvie, Butte & Superior Mining Co.
A. P. Cobb, Mineral Point Zinc Co.
C. T. Orr, Athletic Mining & Smelting Co.

A traffic subcommittee of three was appointed and its chairman represented the zinc producers on the traffic committee of copper, lead, and zinc producers, in negotiations with the Railroad Administration and Government departments in transportation matters.

At the request of Pope Yeatman, who succeeded Eugene L. Meyer as chief of the nonferrous metals section of the War Industries Board, the committee gave considerable time to the question of the variation in value between prime western zinc and Joplin concentrates. At a conference of the committee with the zinc-ore producers of the Joplin district a schedule was adopted with a sliding scale of prices for Joplin concentrates based on the grade of the concentrates and on the average quotation for prime western zinc for the week previous. Before the plan could be thoroughly tested the armistice was declared and the agreement lapsed.

[A copy of the sliding scale is given below. This scale was worked out on an assumed cost of $58 a ton for mining and concentrating and of $33 for smelting.]

Plan governing the purchase and the sale of Joplin blende ore, adopted at a conference between the zinc producers' committee and the Joplin ore producers on October 18, 1918.

1. That the smelters will specify the quantity of ore that they will obligate themselves to take in approximately equal weekly quantities during the period ending January 1, 1919, and that the ore producers will furnish such tonnage, both subject to fires, strikes, accidents, or other causes beyond the control of either party, interrupting, curtailing, or suspending operations at smelters or mines, and neither party shall be liable for damages due to such interruption, curtailment, or suspension.

2. That the ratio shown in the following table shall be the basis of the settlement for 60 per cent zinc Joplin mill concentrates, subject to the variation of $1 for each unit above or below 60 per cent zinc contents, and subject to the customary lime and iron penalties of $1 for each unit of these ingredients in excess of 1 per cent. Sludge material running not below 57½ per cent zinc shall be penalized $2.50 per ton; sludge material assaying less than 57½ per cent zinc and all flotation material shall be penalized $5 per ton. This schedule shall not apply to any ores below 50 per cent zinc.

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Spelter market (in cents).	Ratio.	Price, 60 per cent Joplin ore at mines.	Spelter market (in cents).	Ratio.	Price, 60 per cent Joplin ore at mines.
6.0	6.80 to 1	$40.800	10.6	6.34 to 1	67.204
6.1	6.79 to 1	41.419	10.7	6.33 to 1	67.731
6.2	6.78 to 1	42.036	10.8	6.32 to 1	68.256
6.3	6.77 to 1	42.651	10.9	6.31 to 1	68.779
6.4	6.76 to 1	43.264			
6.5	6.75 to 1	43.875	11.0	6.30 to 1	69.300
6.6	6.74 to 1	44.484	11.1	6.29 to 1	69.819
6.7	6.73 to 1	45.091	11.2	6.28 to 1	70.336
6.8	6.72 to 1	45.696	11.3	6.27 to 1	70.851
6.9	6.71 to 1	46.299	11.4	6.26 to 1	71.364
			11.5	6.25 to 1	71.875
7.0	6.70 to 1	46.900	11.6	6.24 to 1	72.384
7.1	6.69 to 1	47.499	11.7	6.23 to 1	72.891
7.2	6.68 to 1	48.096	11.8	6.22 to 1	73.396
7.3	6.67 to 1	48.691	11.9	6.21 to 1	73.899
7.4	6.66 to 1	49.284			
7.5	6.65 to 1	49.875	12.0	6.20 to 1	74.400
7.6	6.64 to 1	50.464	12.1	6.19 to 1	74.899
7.7	6.63 to 1	51.051	12.2	6.18 to 1	75.396
7.8	6.62 to 1	51.636	12.3	6.17 to 1	75.891
7.9	6.61 to 1	52.219	12.4	6.16 to 1	76.384
			12.5	6.15 to 1	76.875
8.0	6.60 to 1	52.800	12.6	6.14 to 1	77.364
8.1	6.59 to 1	53.379	12.7	6.13 to 1	77.851
8.2	6.58 to 1	53.956	12.8	6.12 to 1	78.336
8.3	6.57 to 1	54.531	12.9	6.11 to 1	78.819
8.4	6.56 to 1	55.104			
8.5	6.55 to 1	55.675	13.0	6.10 to 1	79.300
8.6	6.54 to 1	56.244	13.1	6.09 to 1	79.779
8.7	6.53 to 1	56.811	13.2	6.08 to 1	80.256
8.8	6.52 to 1	57.376	13.3	6.07 to 1	80.731
8.9	6.51 to 1	57.939	13.4	6.06 to 1	81.204
			13.5	6.05 to 1	81.675
9.0	6.50 to 1	58.500	13.6	6.04 to 1	82.144
9.1	6.49 to 1	59.059	13.7	6.03 to 1	82.611
9.2	6.48 to 1	59.616	13.8	6.02 to 1	83.076
9.3	6.47 to 1	60.171	13.9	6.01 to 1	83.539
9.4	6.46 to 1	60.724			
9.5	6.45 to 1	61.275	14.0	6.00 to 1	84.000
9.6	6.44 to 1	61.824	14.1	5.99 to 1	84.459
9.7	6.43 to 1	62.371	14.2	5.98 to 1	84.916
9.8	6.42 to 1	62.916	14.3	5.97 to 1	85.371
9.9	6.41 to 1	63.459	14.4	5.96 to 1	85.824
			14.5	5.95 to 1	86.275
10.0	6.40 to 1	64.000	14.6	5.94 to 1	86.724
10.1	6.39 to 1	64.539	14.7	5.93 to 1	87.171
10.2	6.38 to 1	65.076	14.8	5.92 to 1	87.616
10.3	6.37 to 1	65.611	14.9	5.91 to 1	88.059
10.4	6.36 to 1	66.144			
10.5	6.35 to 1	66.675	15.0	5.90 to 1	88.500

3. The market price of spelter governing settlements will be posted by the Joplin Ore Producers Association each Friday and shall govern for one week. The quotation to be posted by the Joplin Ore Producers Association shall be the average of the daily quotations for prime western spelter at St. Louis as given in the Engineering and Mining Journal for the week ending the Wednesday previous to the Friday of the week in which the quotation is posted.

4. Should this arrangement prove satisfactory, it will be continued from quarter year to quarter year, with such modifications as may be found necessary.

UNITED STATES WAR INDUSTRIES BOARD.

The nonferrous metals section of the War Industries Board from its inception bore a vital relation to the war metal industries. The operations of the section are briefly described in a report from which the paragraphs relating to zinc are given below.[2]

Organization.—The nonferrous metals section was organized in October, 1917, with Mr. Eugene M. Meyer, jr., as section chief. He was assisted by Messrs. O. F. Weber, H. G. Moulton, and E. M. Friedman, and later by Mr. Pope Yeatman. In March,

[2] Report on the activities of the section of nonferrous metals, United States War Industries Board, Dec. 31, 1918.

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1918, Mr. Meyer transferred his activities to a directorship in the War Finance Corporation, and Mr. Yeatman was made section chief. In October, 1918, Mr. Yeatman's title was changed to "Director," and the personnel under him has included E. Coppee Thurston, assistant; Irwin H. Cornell, in charge of lead; George C. Stone, in charge of zinc; Andrew Walz, assistant; and Lieut. H. R. Aldrich, statistician.

The metals handled by this section under Mr. Yeatman are aluminum, antimony, copper, lead, nickel, quicksilver, and zinc. The duty of this section has been to ascertain the requirements of the American and Allied Governments, and the essential commercial needs of the country in these raw materials, and when necessary to encourage an increase in their production. It has been the aim to interfere as little as possible with the normal course of business, and to have the producers, importers, dealers, and consumers feel that it was the section's desire to understand and help them in their difficulties, and it is pleasant to record the almost universal and hearty spirit of cooperation in the industries.

Production.—At the time the United States entered the war there was an ample supply of common spelter and practically sufficient of the high grade. The situation regarding the latter was eased by persuading the Army to make its specifications more liberal as regards cadmium, and there has not been any shortage for either war purposes or ordinary industrial purposes, though the high price due to high labor and fuel costs has restricted some industrial uses.

Causes of shortage.—There was no shortage in zinc metal, but lack of rolling mill capacity limited the production of sheet zinc.

Embargoes.—Export embargoes: All of the metals handled by this section, except zinc, were on the War Trade Board's export conservation list, for which individual licenses were required for shipment.

Prices.—Government prices before fixing: Early in 1917 a zinc committee was appointed to arrange a price for Government purchases, but before an agreement was reached the market price sank below the figures discussed, so no arrangement was made.

Prices fixed by the price-fixing committee: On February 13, 1918, a maximum price on grade A of 12 cents per pound f. o. b. East St. Louis, and maximum base prices on plate zinc of 14 cents and on sheet zinc of 15 cents f. o. b. plant, subject to the usual trade discounts and differentials, were fixed until June 1, 1918. Before the end of May these prices were extended to the 1st of September, and prior to that date they were again extended to January 1, 1919, when they will expire by limitation.

Present trend of prices: The price is now very low and is decreasing from week to week with every indication that it will continue to fall.

Methods of control.—No control was necessary, but a zinc producers' committee was formed in September, 1917, to assist in bringing about better relations between the miners and the smelters.

Methods of purchase.—Purchases were made direct either by negotiation or by requests for competitive bids.

Arrangements made in the industry.—After the maximum price had been fixed on sheet and plate zinc and in order to encourage additional output and help the underpaid mining companies, it was suggested to the zinc rolling mills by the mine operators that they should pay the miners $75 per ton base on 60 per cent zinc concentrates running under a certain percentage of lead, and buy their requirements from all the mines of the Joplin district that produced this grade of ore proportionately. This was accepted, and the High-Grade Ore Producers' Association was formed among these miners. This section then appointed a high-grade ore producers' allocating committee to receive the requirements of the rolling mills and allocate them proportionately to the various members of the association.

An effort was made to assist the Joplin district zinc miners by an arrangement whereby all the producers of the Joplin district were to agree with all the zinc smelters for a sliding scale of prices dependent upon grade. This scheme, however, fell through because the American Metal Co., which is one of the largest buyers, withdrew after having entered the agreement, while the Edgar Zinc Co. and one or two other small companies never came in.

Conservation effected.—When the war ended considerable conservation was in course of being effected by the substitution of sheet zinc for tin plate, galvanized sheet, sheet aluminum, and nickel plate. It is hoped that some of these uses for sheet zinc will continue after the war.

Some conservation of lead was also effected in August and September, 1918, when lead became very scarce, by the use of zinc metal, as in the coffin industry.

High-grade or grade A zinc, for making cartridge cases, was at first purchased solely on the Navy specifications, which were very stringent. The zinc producers and this section, after studying the question, advised the War Department to make its own

specifications for grade A less stringent as to cadmium content than those of the Navy. This was done and resulted in many zinc smelters making Army grade A zinc by redistillation, thus affording another outlet for some of the excess production of zinc of the lower grades.

New capacity.—Early in the war, before the participation of the United States, there was a very great increase in the demand for spelter, mainly for export, which was met in three ways—by increasing existing plants, by reopening abandoned and obsolete plants, and by the construction of new plants.

By the time the United States entered the war, the smelting capacity was more than ample to supply all requirements. To meet the demand for high-grade spelter, special furnaces were built or old ones were altered to refine lower grade spelter. These will be a total loss, except in a few cases where they can be altered to regular smelting furnaces. The present smelting capacity is about twice the normal demand and the present output about 50 per cent greater than the normal. Much of the present active capacity is new construction, as the poorest plants have been forced out of business. Many more plants will be obliged to close down unless the export demand proves to be very large.

Present outlook.—The increase in the production of zinc on account of the war has been relatively greater than that of any other metal. The production in 1907 was 59 per cent greater than that of 1902; that of 1912, 35 per cent greater than 1907; and that of 1917, 97 per cent greater than 1912; and the greater part of the abnormal increase has been in high grade. The stocks in the hands of smelters and the Government are exceedingly large, and the causes that have decreased its use for galvanizing during the war will in part persist. The next largest use, which is for brass and other alloys, will also probably be decreased by the large amounts of scrap brass that are likely to come on the market.

Much zinc will be needed for reconstruction, but the English works have been much increased and will doubtless take care of part of this. Further, much of the zinc required will be in the form of sheet, and our rolling mill capacity is quite limited. The present spelter output is at least 50 per cent greater than the probable home demand, and many works will be obliged to shut down as it is not economical to run at a small fraction of capacity. At present there are 21 plants producing spelter of which not over one-third can be called strong, and at least an equal proportion are decidedly weak.

Outside of the smelters the most serious effect will be in the Joplin mining fields as its ore is always sold weekly for immediate delivery, while in the other districts the ore is sold almost entirely on long-term contracts or the mines are owned by the smelters.

AMERICAN ZINC INSTITUTE.

The American Zinc Institute was organized July 29, 1918, when the first meeting was held at St. Louis, Mo. The institute is composed of miners, smelters, and manufacturers of zinc. Though organized with a view to benefit the industry under peace-time conditions, nevertheless it brought together the principal zinc producers of the country at the height of the war and gave opportunity for full discussion of the conditions confronting the entire industry. The special incentive to organization lay in the extremely low prices of zinc in April, 1918, the lowest since the early part of 1915. The immediate problem was not so much one of speeding up production, as it was in other metal industries, but rather one of action to prevent overproduction and consequent depression and disorganization of the industry, which might result in scarcity at the most critical period of the war. Smelter stocks of about 53,700 tons at the beginning of 1918 had been reduced to 44,500 tons by the middle of the year, and conditions were therefore somewhat more satisfactory at the time of organization.

Among the policies of the institute are to obtain the widest possible use of zinc products by means of research and publicity, to promote a better knowledge of foreign output and resources through the operation of a statistical bureau, and to promote efficiency and

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progress in the industry through scientific research and mutual exchange of data.

The institute held itself at the service of the Government at all times, and after the armistice was declared it helped to formulate plans for the disposal of the surplus of Government-owned zinc to the least injury of the industry.

The address is American Zinc Institute (Inc.), Stephen S. Tuthill, Secretary, 27 Cedar Street, New York City.

WAR EXPORTS OF ZINC.

The following tables bring together the quantity and value of the exports of zinc and manufactures of zinc for the period of the war. As these tables have been published in this form only during the war, they are given here to round out the foregoing account of the war relations of the zinc industry. For the greater part they are not duplicated elsewhere in this chapter.

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Zinc exported from the United States, 1914–1918, by classes.

Material.	1914		1915		1916		1917		1918	
	Quantity (pounds).	Value.	Quantity (pounds).	Value.	Quantity (pounds).	Value.	Quantity (pounds).	Value.	Quantity (pounds).	Value.
DOMESTIC.										
Zinc ore	22,220,800	$388,464	1,664,320	$35,276	156,800	$3,992	2,640,960	$63,043	123,000	$2,480
Zinc slabs and sheets	129,604,022	8,540,668	237,205,928	29,537,680	326,269,687	51,311,047	307,592,422	38,336,559	160,487,439	17,036,378
Zinc dross	5,071,067	240,944	8,333,513	506,956	96,575	10,801	26,604,989	2,126,909	31,631,364	2,238,913
Zinc manufactures		210,908		1,951,949		574,229		570,352		722,671
Brass, old, for remanufacturing	20,639,401	2,100,870	11,256,472	1,259,537	6,956,212	1,305,050	8,298,989	1,758,384	4,909,717	799,318
Brass, bars, plates, and sheets	7,115,807	909,153	66,272,144	12,435,782	244,531,706	72,683,626	326,346,666	101,521,426	30,989,717	9,522,934
Brass, articles made from		3,756,888		41,146,025		241,668,081		136,611,299		19,483,146
Cartridges		6,567,122		25,408,079		55,103,904		42,122,656		10,764,765
FOREIGN.										
Zinc, blocks, pigs, and old	11,159,571	218,145	25,550,014	2,355,557	86,459,495	8,080,442	129,360,631	12,429,356	40,138,715	3,532,968
Zinc dust	350,262	17,472	431,815	55,387	390,578	57,695	158,175	21,118	79,512	10,392
Zinc manufactures		18,544		119,104		1,072		50		
Zinc used in articles exported with benefit of drawback	8,256,012	[a] 231,450	63,240	[a] 7,936			3,176,615	[a] 100,478	12,673,361	[a] 364,080
		23,200,628		114,819,368		430,799,939		335,667,630		64,478,045

[a] Declared value of the zinc used in making the articles exported with benefit of drawback.

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Zinc slabs and sheets exported from the United States, 1914–1918, by destination, in short tons.

Destination.	1914		1915		1916		1917		1918	
	Domestic.	Foreign.	Domestic.	Foreign.	Domestic.	Foreign.	Domestic.	Foreign.	Domestic.	Foreign.
Canada	3,383	706	11,138	585	10,216	708	9,427	4,026	6,996	1,052
Great Britain	40,847	2,897	54,526	5,122	60,529	18,847	71,555	24,739	28,334	6,908
Netherlands			12		9			112		
France	8,463	1,902	25,255	6,064	51,810	19,465	41,901	21,596	25,140	10,373
Italy	1,651		8,768	952	14,081	3,933	10,593	9,873	6,130	1,537
Germany	84									
Russia	4,819		12,091		11,786	124	8,238	2,443		
Japan	456		657		882		1,360		5,287	
Other countries	5,099	75	6,156	52	13,822	153	10,722	1,891	8,357	199
	64,802	5,580	118,603	12,775	163,135	43,230	153,796	64,680	80,244	20,069

Zinc slabs and sheets exported from the United States, 1914–1918, by months, in short tons.

Month.	1914		1915		1916		1917		1918	
	Domestic.	Foreign.	Domestic.	Foreign.	Domestic.	Foreign.	Domestic.	Foreign.	Domestic.	Foreign.
January	230	28	15,299	84	10,433	3,531	15,351	2,650	10,435	4,201
February	18		13,002	2,017	10,328	3,919	15,549	4,880	3,226	711
March	146		8,150	1,136	8,171	575	17,408	8,230	7,354	2,036
April	60		8,842	77	9,133	1,902	13,119	3,248	7,509	1,714
May	107	112	7,637	1,104	8,583	4,811	19,528	9,946	4,341	2,979
June	269	27	9,470	1,286	11,309	5,459	12,308	2,246	7,408	417
July	157		6,492	1,876	12,708	4,508	8,863	2,240	5,161	181
August	3,448	319	7,271	421	18,661	4,232	11,307	758	4,055	1,374
September	19,045	1,120	8,654	1,513	19,125	985	8,749	19,624	6,203	1,908
October	10,259	1,140	12,091	608	19,994	6,110	6,057	2,451	8,578	1,464
November	12,747	957	10,019	2,343	18,988	4,260	8,017	1,248	7,478	1,280
December	18,316	1,877	9,701	310	15,652	2,958	17,540	7,179	8,496	1,804
	64,802	5,580	118,603	12,775	163,135	43,230	153,796	64,680	80,244	20,069
Foreign zinc used in articles exported with benefit of drawback		4,128		32				1,588		6,337

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The statistics of exports of wire, including barbed and all other wire, as given by the Bureau of Foreign and Domestic Commerce, Department of Commerce, do not distinguish between plain wire and galvanized wire, so that the table below gives no clue to the quantity of galvanized wire exported. The great increase in exports of wire during the war indicates that both the output and exports of galvanized wire must have been greatly increased, as most of the wire used in entanglements, both barbed and plain, was galvanized.

Domestic wire exported from the United States, 1913–1918, in short tons.

	1913	1914	1915	1916	1917	1918
Barbed wire	91,897	105,108	278,454	469,148	216,687	263,293
All other wire	121,222	97,465	251,964	295,839	225,651	176,089
	213,119	202,573	530,418	764,987	442,338	439,382

PRODUCTION AND CONSUMPTION OF ZINC BY SIX-MONTH PERIODS.

In view of the fact that the annual report on zinc is not ready for publication until late in the year it has been customary to include a table showing the production of zinc by smelters in six-month periods, and to include the period following the year to which the annual report refers. Such a table for the period of the war seems properly to belong here in the section dealing with the war activities of the industry.

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Zinc produced and consumed in the United States, 1914–1919, by six-month periods, in short tons. [a]

	1914		1915		1916		1917		1918		1919
	First half.	Last half.	First half.	Last half.	First half.	Last half.	First half.	Last half.	First half.	Last half.	First half.
Supply:											
Stock at beginning of period	40,659	64,039	20,095	5,884	14,253	23,879	17,598	33,147	53,721	44,502	41,241
Production—											
From domestic ore	171,496	171,922	207,634	250,501	267,696	296,642	311,539	273,058	242,976	249,429	247,584
From foreign ore	3,562	6,069	8,898	22,486	48,756	55,249	49,599	35,377	14,287	11,235	7,918
Imports (mostly scrap)	506	374	489	415	464	220	136	121	31	4	45
	216,223	242,404	237,116	279,286	331,169	375,990	378,872	341,703	311,015	305,170	296,788
Withdrawn:											
Exports from warehouse	167	5,413	5,704	7,071	20,197	23,033	31,180	33,500	12,056	8,011	9,620
Exports under drawback	1,881	2,247	32	.....	.....	.....	.....	1,588	1,851	4,486	3,727
Domestic exports—											
Slabs	830	63,972	64,368	54,235	52,546	98,077	85,578	51,704	34,559	31,809	52,989
Sheets					5,461	7,051	7,685	8,829	5,712	8,164	11,300
Stock at end of period	64,039	20,095	5,884	14,253	23,879	17,598	33,147	53,721	44,502	41,241	59,651
	66,917	91,727	75,988	75,559	102,083	145,759	157,590	149,342	98,682	93,711	137,287
Apparent consumption	149,306	150,677	161,128	203,727	229,086	230,231	221,282	192,361	212,333	211,459	159,501
Zinc smelted in											
Arkansas	.....	.....	.....	.....	.....	7,503	12,476	13,184	11,773	14,980	14,029
Illinois	62,062	65,884	74,982	84,976	90,082	91,351	95,149	77,340	69,672	72,172	61,701
Kansas	23,737	20,773	35,247	66,176	74,592	66,694	42,359	33,689	12,803	16,346	22,034
Oklahoma	45,443	45,924	51,172	58,036	73,298	94,908	109,130	95,264	69,157	69,909	65,272
Pennsylvania	13,752	14,343	18,828	25,339	31,593	41,952	44,052	42,943	39,133	38,209	37,108
Other States	30,064	31,067	36,303	38,208	42,190	40,064	40,359	38,419	35,273	29,584	32,147
Electrolytic zinc	.....	.....	.....	252	1,697	9,419	17,613	7,596	19,452	19,464	23,211
Total primary zinc	175,058	177,991	216,532	272,987	316,452	351,891	361,138	308,435	257,263	260,664	255,502
Redistilled secondary zinc	10,113	10,432	13,546	16,218	9,924	18,852	12,145	4,690	3,585	6,333	7,328
	185,171	188,423	230,078	289,205	326,376	370,743	373,283	313,125	260,848	266,997	262,830
Yearly total	373,594		519,283		697,119		686,408		527,845		.....
Zinc ore imported			66,683	92,169	231,845	154,119	142,180	69,415	45,086	25,816	18,570
Zinc content of imported ore			23,997	33,672	93,907	54,240	48,958	23,516	15,820	8,989	6,314
Zinc ore exported			677	155	33	45	35	1,285	62	.....	.....
Zinc dross exported			2,932	1,235	28	20	5,236	8,066	7,576	8,240	5,010
Total number of retorts at end of period	.....	115,114	130,642	156,508	196,640	219,418	224,778	220,960	176,098	168,544	158,988
Total number of retorts in operation at end of period	.....	94,500	129,000	155,000	177,500	204,500	189,500	132,750	107,500	123,500	82,000

[a] Revised from mid-year statement as issued in August, 1919.

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CHART OF PRODUCTION AND CONSUMPTION OF ZINC DURING THE WAR.

The chart (fig. 19) shows graphically, for the period of the war, the total supply of zinc (excluding that recovered in pigments smelted directly from ore) and the consumption in this country. The space between the curve marked "production," which shows the output of zinc, and the curve marked *a* shows the stocks at the

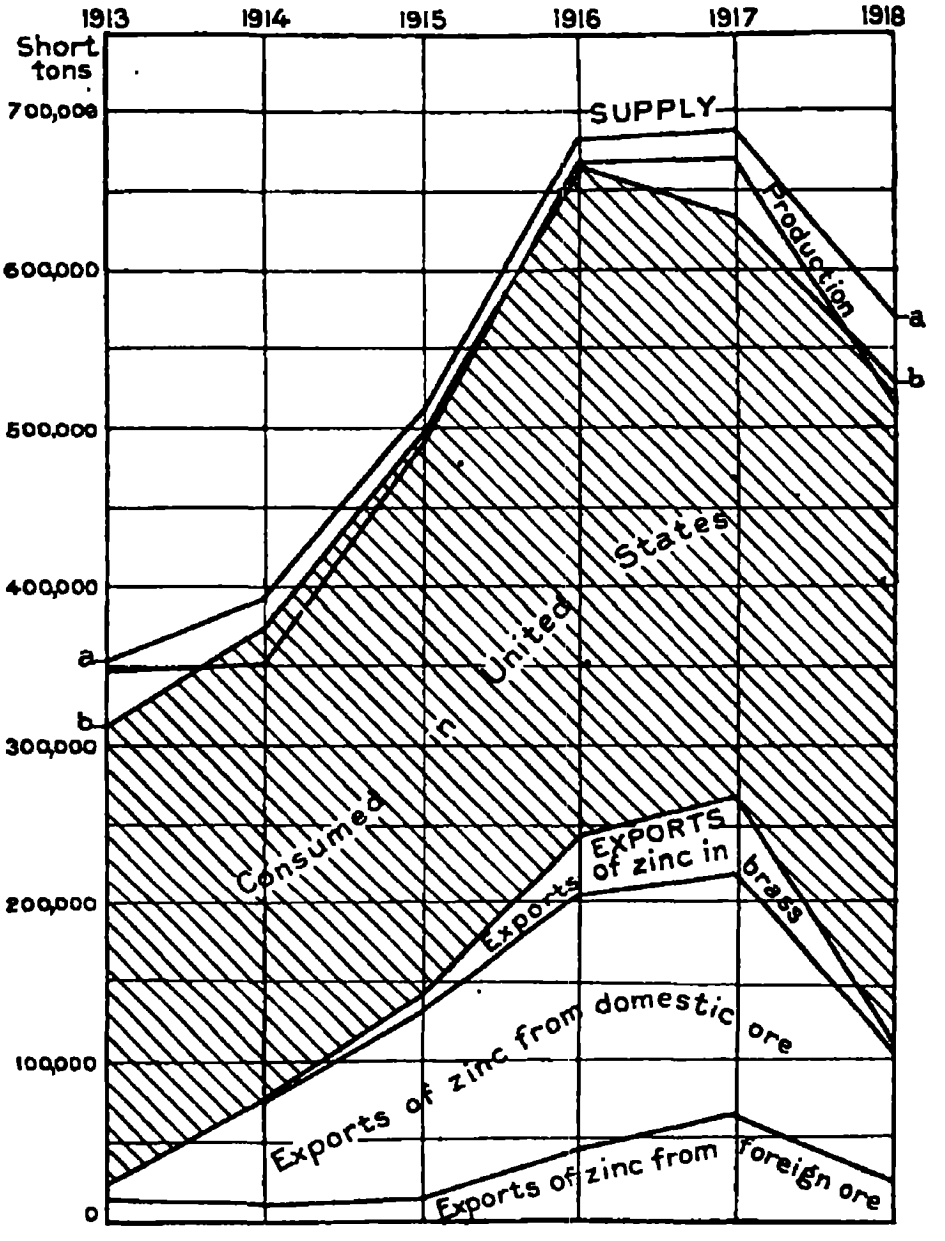

FIGURE 19.—Chart showing production and consumption of zinc during the World War.

beginning of the year. The curve *a* therefore represents the total "supply," as the imports of zinc for the period are negligible on the scale of the chart. To get the consumption, the stocks at the end of the year (represented by the space between curves *a* and *b*) must be deducted from the total supply, and therefore the shaded area

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presenting "consumption" is limited above by the line *b*. The aded area is limited below by the line showing total "exports," ade up of exports of zinc made from domestic and foreign ore as well of zinc in articles exported with benefit of drawback and exports zinc in brass, which grew to large proportion in 1916–17. The mestic consumption in 1916 was about one-half greater than in 13 and 1914, and though it fell off slightly in 1917 it recovered in 18. Zinc sent abroad for the use of the American Expeditionary rces is not regarded as exported, and this accounts in part for e expansion in 1918.

GRADES OF ZINC USED DURING THE WAR.

Zinc is classified into grades according to its analysis. The grades nerally specified before the war were the "high grade," "inter- diate," "brass special," and "prime western" of the American ciety for Testing Materials, adopted in 1911. In 1917 the society ded another grade, "selected." The War and Navy Departments ewise purchased on closely similar specifications, but the grades ere represented by letters, "high grade" being "grade A." As ost zinc during the war was brought under these Government ecifications the grading by letters largely superseded the older assification for the time being. Since the war the tendency of the ade is to go back to the old familiar grading. The different classi- ations, with the authorities and dates of adoption, are given in e accompanying table.

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Zinc specifications, showing minimum zinc required and maximum impurities permitted, 1911-1918, in per cent.

	Grade A.				Grade B.				Grade C.						Grade D.			
	"High grade," A. S. T. M., 1911.[a]	"High grade No. 1," A. S. T. M., 1918.[b]	Navy, 1917.[c]	Army, 1918.[d]	"Intermediate," A. S. T. M., 1911.[a]	"Intermediate, No. 2," A. S. T. M., 1917.[b]	Navy, 1917.[c]	Army, 1918.[d]	"Brass special No. 3," A. S. T. M., 1917.[b]	"Brass special," A. S. T. M., 1911.[a]	Navy, 1913.[e]	"Selected No. 4," A. S. T. M., 1917.[b]	Navy, 1917.[c]	Army, 1918.[d]	"Prime western," A. S. T. M., 1911.[a]	Navy, 1913.[e]	"Prime western No. 5," A. S. T. M., 1917.[b]	"Prime western," Metal Exchange, 1916.[f]
Zinc, minimum	.....	.....	99.85	99.50	.....	.....	99.35	99.35	.....	.....	98.60	.....	98.00	98.00	.....	98.00	.....	.....
Cadmium, maximum	0.05	0.07	.05	.50	0.50	0.50	.50	.50	0.50	0.75	.75	0.75	.75	.75	.....	.75	.....	.....
Iron, maximum	.03	.03	.03	.03	.03	.03	.03	.03	.03	.04	.04	.04	.08	.08	0.08	.08	0.08	0.08
Lead, maximum	.07	.07	.07	.10	.20	.20	.20	.25	.60	.75	.75	.80	1.00	1.00	1.50	1.50	1.60	2.00
Cadmium, iron, and lead, maximum sum	.10	.10	.10	.50	.50	.50	.50	.65	1.00	1.20	1.20	1.25	1.50	1.50	.....	2.00	.....	.....
Aluminum, maximum	None.	None.	None.	None.	None.	None.	None.	None.	None.	None.	Tr.	None.	Tr.	Tr.	.....	Tr.	.....	.....
Other elements, maximum	.....	.....	None.	None.	.....	.....	Tr.	Tr.	.....	.....	Tr.	.....	Tr.	Tr.	.....	Tr.	.....	.....

[a] Am. Soc. Test. Mat. Proc., vol. 11, pp. 147-149, 1911. Adopted Aug. 21, 1911.
[b] Am. Soc. Test. Mat. Proc., vol. 18, pp. 883-886, 1918; vol. 17, pp. 180-181, 1917.
[c] Navy Department specifications 672d, June 1, 1917.
[d] U. S. Army, Ordnance Department, specifications, revised Mar. 7, 1918.
[e] Navy Department, specifications 672b, Nov. 1, 1913.
[f] New York Metal Exchange, specifications; American Metal Market, Aug. 31, 1916.

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TRADE CONDITIONS.

WORLD'S PRODUCTION.

Owing to the disturbed conditions in Europe complete figures of the world's production of zinc are not available.

The following statistics, though incomplete, show approximately the foreign production during the war. The figures in black-faced type are taken from the official statistics of the countries named; those in the ordinary type are taken from statistical handbooks, consular reports, market letters, and trade journals. There is always a possibility of duplication in figures showing European production, for some countries send crude zinc of poor quality to other countries for refining. Furthermore, secondary zinc is included in the figures showing the foreign production, so that to put the United States on an equal footing in the statistics it would be necessary to include in its production the domestic output of secondary zinc.

World's production of zinc, 1913–1918, in metric tons.

[By countries in which smelted; reduced where necessary to metric tons.]

Country.	1913[a]	1913	1914	1915	1916	1917	1918
Australia	3,724	4,187	5,094	5,398	5,262	4,769	5,712
Austria	21,707	19,508	(b)	(b)	(b)	(b)	(b)
Belgium	197,703	204,220	145,925	51,660	22,960	10,290	9,245
Canada				20	2,698	9,058	11,159
China	(b)	(b)	(b)	(b)	(b)	(b)	(b)
France	64,103	67,890	42,478	19,180	20,258	22,929	18,247
Germany	283,113	283,113	(b)	(b)	(b)	(b)	(b)
Great Britain	59,146	66,243	50,000	45,000	60,000	50,000	50,000
Holland	24,323	(b)	16,458	11,120	(b)	(b)	(b)
Italy					258	267	1,188
Japan		900	5,881	21,132	28,994	54,716	44,500
Norway	9,287	9,287	12,000	25,000	32,000	22,000	(b)
Russia	7,610	10,500	6,200	2,000	1,100	(b)	(b)
Siberia					218	569	(b)
Spain	6,920	6,006	11,782	8,117	8,522	10,155	15,900
Sweden		2,115	2,200	8,588	9,997	7,979	4,098
Tasmania						49	3,883
United States	320,283	314,496	220,279	444,082	606,207	607,423	469,858
	997,919						

[a] Statistics from the Metallgesellschaft for 1913, given for comparison. [b] Statistics not available.

IMPORTS AND EXPORTS.

The following tables of imports and exports of zinc and of zinc remaining in warehouses are made up from the publications and records of the Bureau of Foreign and Domestic Commerce of the Department of Commerce.

WAREHOUSE TRANSACTIONS.

Zinc imported into the United States as metal or in ore may be entered for immediate consumption, in which case the duty is paid and the zinc goes direct to the importer; or it may be entered for warehouse, bond being given for double the amount of the estimated duty. In accordance with the usage of the Bureau of Foreign Commerce, the term "General imports" in the accompanying tables indicates the total zinc imports, including both zinc articles entered for

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STATISTICAL SUPPLEMENT

OF THE

ENGINEERING AND MINING JOURNAL.

THE MINERAL INDUSTRY,

ITS

STATISTICS, TECHNOLOGY AND TRADE,

IN THE

UNITED STATES AND OTHER COUNTRIES

TO THE END OF

1896.

VOL. V.

EDITED BY

RICHARD P. ROTHWELL,

Editor of the Engineering and Mining Journal; Ex-President American Institute of Mining Engineers; Member American Society of Civil Engineers; Fellow Royal Statistical Society, London, Etc., Etc., Etc.

NEW YORK AND LONDON:

THE SCIENTIFIC PUBLISHING COMPANY.

1897.

EPA7-002172

ZINC AND CADMIUM.

By Walter Renton Ingalls.

The chief features of the zinc industry in the United States in 1896 were a combination of a large number of the smelting companies, and the exportation of spelter and ore to Europe. The first was consummated in January, when the Cherokee Smelting and Refining Company (Pittsburg, Kan., and Weir City, Kan.), Robert Lanyon & Co. (Pittsburg, Kan., and Nevada, Mo.), S. H. Lanyon & Bros. (Pittsburg, Kan.), Pittsburg & St. Louis Zinc Company (Pittsburg, Kan.), Girard Zinc Company (Girard, Kan.), Rich Hill Mining and Smelting Company (Rich Hill, Mo.), Scammonsville and Columbia Smelting Companies were united, partly by purchase, partly by lease, in the Cherokee-Lanyon Spelter Company. These works had then a capacity of 35,000 tons per annum, at the most, while works with capacity of 40,000 tons, including the best equipped of all, viz., those of Peru and LaSalle, Ill., remained outside the combination. The new company promptly adopted a policy of concentration of smelting in a few works and restriction of output, the effect of which is outlined in the market review subjoined.

At the beginning of September the price of zinc had fallen to 3.25@3.30c. at St. Louis, which was below the parity of the European market, where conditions had been steadily improving since the first of the year, and it became possible to export American spelter, which was done until the first of November, when it became more profitable to market the product at home. The total exportation for the year amounted to 10,130 tons.

Shipments of zinc ore to Europe also attained important proportions, about 15 carloads going from Joplin to Swansea, a little from Tennessee, and a good deal from New Jersey, the total amounting to 2075 tons.

It is unlikely that exports of zinc ore from Missouri will attain large volume in the near future, owing to high freight rates to the seaboard, but it is probable that those from New Jersey will become more and more important. The business originated through the production on a large scale of zinkite-willemite concentrates by the Wetherill process at Franklin Furnace, N. J. These concentrates average 49 to 51% Zn, 2 to 3% Fe, 4 to 5% Mn, and scarcely more than a trace of lead, wherefore they are very desirable for the manufacture of high-grade spelter. For this purpose a market for them has been found at the Grillo works in Westphalia, and the exportation, which was begun about the first of September, now amounts to from 700 to 1000 tons per month, which is shipped in bulk via Antwerp or Rotterdam.

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It is not easy to understand how zinc can be produced at a profit when the price in St. Louis is as low as 3.25c., or even 3.50c., which was more than the average in 1895. Yet new works have been built at Iola, Nevada, and Upland, in the Missouri-Kansas district, and others are planned. Probably there are few which are making money except the larger works, especially those of Illinois, which have rolling mills and sulphuric acid factories in connection with them. The Illinois Zinc Company, of Peru, Ill., followed the example of its neighbor at LaSalle and installed an acid plant last year. Probably the only other noteworthy improvements in the Western works was the introduction of new mechanical roasting furnaces, the Brown, Pearce, etc., which are doing good work and clearly controverting the European opinion as to the advantage of automatic blende-roasting.

PRODUCTION OF SPELTER IN THE UNITED STATES.

States.	1891.	1892.	1893.	1894.	1895.	1896.
Illinois and Indiana	28,660	30,227	29,725	28,948	33,748	31,656
Kansas	21,460	22,953	22,055	26,060	25,916	36,506
Missouri	16,205	16,169	13,737	12,000	10,736	
South and East	13,988	14,733	10,708	6,996	11,468	9,415
Total tons of 2000 lbs.	80,963	84,082	76,255	74,004	81,858	77,697
Total tons of 2240 lbs.	71,682	75,073	68,525	66,074	73,088	69,319
Total metric tons	72,816	76,228	69,159	67,135	74,245	70,434

PRODUCTION OF ZINC OXIDE IN THE UNITED STATES.

Year.	Quantity.		Value.		Year.	Quantity.		Value.	
	Short Tons.	Metric Tons.	Totals.	Per Short Ton.		Short Tons.	Metric Tons.	Totals.	Per Short Ton.
1893	25,000	22,679	$1,875,000	$75.00	1895	22,690	20,498	$1,588,300	$70.00
1894	22,814	20,697	1,711,875	75.00	1896	16,799	15,240	1,259,925	75.00

IMPORTS OF ZINC AND ZINC OXIDE INTO THE UNITED STATES. (IN POUNDS.)

Year.	Sheets, Blocks, Pigs, and Old.		Manufactures.	Total Value.	Oxide.	
					Dry.	In Oil.
1892	410,896	$23,807	$22,709	$46,016	2,442,014	111,190
1893	425,998	22,301	20,756	43,057	3,900,749	254,805
1894	512,932	17,271	12,342	29,613	2,850,771	113,549
1895	864,113	29,852	12,183	41,535	4,546,098	129,365
1896	856,044	25,904	15,728	41,632	4,572,781	211,088

EXPORTS OF ZINC AND ZINC ORE FROM THE UNITED STATES. (IN POUNDS.)

Year.	Ore and Oxide.		Plates, Sheets, Pigs, and Bars.		Manufactures.	Total Value.
1892	2,068,560	$41,186	12,494,335	$669,549	$161,794	$872,529
1893	109,780	1,271	7,446,934	413,678	225,257	640,201
1894		5	3,621,954	144,278	99,418	243,701
1895	48,000	1,008	3,141,285	155,975	50,126	207,109
1896	4,150,000	47,408	20,960,169	1,013,680	51,216	1,112,304

The zinc industry in Europe was more prosperous in 1896 than in the two years previous, consumption being large and prices having an upward tendency. As a

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consequence production was increased about 3000 tons in Silesia and 8000 tons in Belgium (the latter being attributable chiefly to the Vieille Montagne Company). In the Rhine district there was a falling off in production from 27,125 to 26,420 long tons, and in England from 29,495 to 25,880 long tons, but this was a good deal more than made up in France, where the Malfidano Company more than doubled its output, and the Real Asturiana made a large increase. The Spanish works of the latter company, however, which is the only producer in Spain, put out only the same amount of metal as in the previous year. The small works at Limburg, Holland, reported no production.

In Upper Silesia there was the same number of works in operation as in the previous year, but the industry is now concentrated in the hands of eight companies. The "Borgwerksgesellschaft Georg v. Giesche's Erben" began the erection of a new works, which is expected to be in operation by the middle of 1897. The Grillo works in Westphalia began the manufacture of high-grade spelter from New Jersey ore in rivalry with the Vieille Montagne Company, and a small amount of electrolytic spelter from Duisburg was on the market. A new zinc-rolling mill was established at Budapest, Hungary.

PRODUCTION OF ZINC IN THE WORLD. (a) (IN METRIC TONS.)

Year.	Austria.	Belgium.	England.		France.	Germany	Russia.	Spain.	United States.	Totals.
			Native Ores.	Foreign Ores.						
1890.....	5,449	82,701	8,698	20,922	19,872	139,366	3,774	5,919	61,111	347,806
1891.....	5,006	86,999	9,087	20,846	20,596	139,353	3,677	5,592	72,816	362,922
1892.....	5,287	91,546	9,500	21,302	20,609	139,998	4,374	5,928	76,256	374,699
1893.....	5,870	95,065	9,585	19,397	22,419	142,956	4,522	5,752	69,159	375,525
1894.....	6,810	97,041	8,260	24,448	23,387	143,577	5,014	5,100	67,185	380,772
1895.....	6,456	107,664	6,760	23,241	24,200	150,286	55,089	5,845	74,945	408,786

(a) Compiled from the official reports of the respective countries, with the exception of the column of zinc in England from foreign ores, which is arrived at by deducting the zinc as reported in the official blue books from the total output of the smelting works as stated in the reports of Messrs. Henry R. Merton & Co.
(b) Merton's figure.

PRODUCTION OF ZINC IN THE WORLD. (a) (IN METRIC TONS.)

Year.	Belgium, France, and Rhenish Prussia.	Upper Silesia.	Great Britain.	Spain.	Austria.	Russia (Poland).	United States	Totals.
1895.....	192,806	95,519	29,967	5,845	6,469	5,039	74,945	411,409
1896.....	205,511	97,409	26,294	6,000	9,403	6,264	70,432	421,313

(a) This table is based on the figures of Henry R. Merton & Co. Those for Belgium, France, and Rhenish Prussia do not permit of segregation in advance of the official statistics, since certain companies own works in two or three countries and report their production in the aggregate. For Spain the figures reported by Señor Don Roman Oriol have been adopted. The statistics for the United States are those collected from the producers by THE MINERAL INDUSTRY. It will be observed that Merton's figures for Austria in 1895 are higher than the official report gives, and since this has been uniformly the case for several years it may be assumed that those for 1896 are correspondingly high, notwithstanding that the Austrian statisticians include the make of zinc-grey with the spelter. The discrepancy appears to be due to the Galician works, which give higher figures to Messrs. Merton than to the Government, those for the three remaining works in Austria agreeing closely. Merton's figures for Belgium, France, and Germany in 1895 give a total of 287,894 metric tons, against 282,150 tons reported by the three governments for that year.

ZINC MINING IN THE UNITED STATES.

The most important feature in zinc ore mining in the United States in 1896 was the final adjustment of the litigation between the New Jersey companies and the probability of the speedy inauguration of operations by them on a larger scale.

EPA7-002175

WILL FORECLOSE LANYON MORTGAGE

FORMAL STEPS BEING TAKEN IN THE LANYON ZINC CASE.

PROTECTING BOND HOLDERS

END RECEIVERSHIP AND REORGANIZE THE COMPANY.

Plants Will Be Sold to Satisfy Judgment for $2,000,000 and Unpaid Interest.

A judgment for $2,464,660, and an order of foreclosure was granted to the Trust Company of America against the Lanyon Zinc company by Judge Oscar Foust this morning. The property of the company was also ordered sold to pay the indebtedness. The date of the sale will be set by the sheriff after the order has been placed in his hands.

Acting for the bondholders, the Trust Company of America instituted the action to foreclose last spring and J. O. Rodgers, president of the Lanyon company, was made receiver, and has been in charge of the plants since that time. He will be retained as receiver until the sale of the property.

When the case came up for final hearing this morning C. H. Werner, of the firm of Parker, Hatch and Sheahan, of New York City, and C. E. Benton of Ft. Scott, appeared for the plaintiff, and A. H. Campbell for the defendant. Mr. Judson, assistant treasurer of the plaintiff company, took the stand and testified as to the amount of bonds issued by the defendant. He said the defendant had defaulted in the sum of $2,464,660 in the interest payments on the bonds. J. O. Rodgers, the receiver, who followed Mr. Judson, testified that in his judgment the property would bring more if sold as a whole than if parcelled out. It is understood that the property will be sold as a whole. Mr. Judson and Mr. Rodgers were the only witnesses called, the evidence being largely documentary.

The sale of property will be harvest for the sheriff as he is paid a commission for conducting such a sale. He is allowed three per cent on the first $100, 2 per cent on the next $400, one per cent on the next $500 and one-half of one per cent on the rest.

THE WEATHER.

Forecast for Kansas: Snow tonight or Thursday; rising temperature.

Data recorded at U. S. Weather Bureau Office today, yesterday and a year ago.

February 22.

	Yest'd'y.	Yr.Ago
2 p. m.	27	57
4 p. m.	26	61
6 p. m.	23	57
8 p. m.	15	57
10 p. m.	10	54
12 midnight	7	51
Maximum temperature	28	61
Minimum temperature	7	40
Precipitation 7 p. m.	T	0 05

February 23.

	Today.	Yr.Ago
2 a. m.	6	51
4 a. m.	5	50
6 a. m.	4	51
8 a. m.	4	46
10 a. m.	5	45
12 noon	6	48
Precipitation 7 a. m.	0	0 35

THIS IS IOLA, RHODE ISLAND

K. C. STAR MAKES ANOTHER DETOUR FROM THE TRUTH.

Classes Scott as Rhode Islander One Day and a Troglodyte When He Heeds McCook Post.

The Kansas City Star might properly carry at the top of its front page the line: "Consistency, thou art a mule!" For the Star never permits a little thing like consistency to interfere with its warfare on man or measure which it decides to down. The quality of the entertainment thus furnished by the Star is enhanced by the smirking air of hypocritical virtue which it wears like a mask; the viciousness of its malice lies in the fact that it would require the combined effort of an hundred country papers to correct any lie the Star might see fit to circulate. That the Star is deliberately and wantonly inconsistent is merely evidence of the contempt it has for that small portion of its readers who detect it in any one of its petty tricks. Yet as time has passed, this policy has developed a pretty general knowledge that the Star is vicious, even among men who admire it as a news disseminator.

Last night the Star said: "Representative Scott of Kansas, objects to the government's lending army tents for use at an ex-Confederate reunion. It is such grim and stern performances as this in the face of duty that

FORT SCOTT BOY RELEASED AT L

J. A. COOK WAS IMPRISONED MEXICAN JAIL.

LOCKED UP FOR SIX MO

WAS CONDUCTOR OF TRAIN THE MEXICANS ROBBE

State Department Requested T Be Admitted to Bail and Fin Won Out.

(By the Associated Press) Ft. Scott, Feb. 23.—J. A. Co American railway conductor, w been in jail at Guadalajara, for the last six months, was today, according to a telegram by his father in this city. detention in jail was denoun the Brotherhood of Conduc America. This order made an to President Taft and the St partment has been investigatin

Mexico has a law holding c ors of trains responsible for ies or accidents to their trains train was systematically rob the Mexican crew, and under Cook was placed in jail. Ef release him failed and the An working on the Mexican railro cided to quit in a body. The S partment, also, got busy, C man Scott having been reque Bourbon county people to p matter. Little progress seem made, but efforts did not ce the release of Cook is the resu months he was ready to give b the government, which ow roads, would not accept bail. guished in prison, suffering i and mind and the news that h last been freed, if only bond, welcomed.

TO LEAVE IN MARC

Rev. Elliott and Roy Boat Engage in Evangelistic W

Rev. H. R. Elliott and Ro right who decided some tim engage in evangelistic wor leave here March second. T first go to Independence, wh will assist in a meeting for of days after EPA7-001826-w to Sapulpa for a several wee

EPA7-001826-w

ceiver until the sale of the property.

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The history of the Lanyon Zinc company's case is familiar to most Allen county people. The company is the result of a union of the gas lands and wells of the Palmer Oil & Gas company and the smelters of the Lanyon family northwest of Iola. Bonds were sold and a large plant and rolling mill erected at LaHarpe.

Mr. J. S. Rodgers, father of James O. Rodgers, was president, and the company flourished wonderfully for some years. A change in management was made, a new president put in who swept the office clean and put in a group of high-priced experts and the surplus dwindled away. Before the tide could be turned interest on the bonds had been defaulted, and it was to protect the bond-holders that the receivership was asked for. James O. Rodgers, then president of the company, was made receiver. The present court action is a foreclosure of the mortgage of the bond-holders and when the company's affairs are reorganized it is hoped that more extensive operation of the plants and an encouraging profit to the company may develope.

Assault at Mildred.

County Attorney H. A. Ewing received a phone message from Mildred this morning stating that an assault had taken place there. Mr. Ewing advised that the complaint be made in the justice court at Mildred. The nature of the assault was not learned.

Roe Smizer came down yesterday from Kansas City.

John Amos was up from Humboldt this afternoon on business.

Raymond Carter has been granted a divorce from Betty Carter.

A girl baby was born this morning [illegible] of 610 North

the line: "Consistency, thou art a mule!" For the Star never permits a little thing like consistency to interfere with its warfare on man or measure which it decides to down. The quality of the entertainment thus furnished by the Star is enhanced by the smirking air of hypocritical virtue which it wears like a mask; the viciousness of its malice lies in the fact that it would require the combined effort of an hundred country papers to correct any lie the Star might see fit to circulate. That the Star is deliberately and wantonly inconsistent is merely evidence of the contempt it has for that small portion of its readers who detect it in any one of its petty tricks. Yet as time has passed, this policy has developed a pretty general knowledge that the Star is vicious even among men who admire it as a news disseminator.

Last night the Star said: "Representative Scott of Kansas, objects to the government's lending army tents for use at an ex-Confederate reunion. It is such grim and stern performances as this in the face of duty that have won for Mr. Scott the title of 'Inexorable Charley.'"

Pleased with that witticism—for in the vocabulary of the Star, a "witticism" consists in tacking an opprobrious name to a man and then claiming that the "people" have named him—the Star moves on in the morning issue of today, and includes the members of McCook Post and other G. A. R. posts who have protested against the grant, in the sneer which is expected to prejudice the public against Scott. It says:

"Troglodytes."

"As Representative Scott of Kansas was fully 5 years old when Lee surrendered—or was it 4½?—it is not surprising that the bitterness of the war still rankles in his soul and that he should interpose a stern objection in the House to a gracious act that was intended to emphasize the healing of the breach of a half-century ago. In the Senate, when it was proposed to authorize the use of army tents for a reunion of ex-Confederates, only one troglodyte crept out of his cave wrapped his bear hide about him and flourished his stone ax. The senators listened in bored silence to the tirade, refused to dignify it with a reply and contemptuously voted, to a man, against the reviving of the issue of the bloody shirt.

"By his action yesterday in blocking the loan of the tents—a loan whose sole significance would have been to promote affection for a common country—Mr. Scott allied himself with the discredited Heyburn. At the end of the Idaho senator's speech the country congratulated itself that it had only one man of that type in public life. It now finds that it had two.

"Have you noticed that in all the era of waving the bloody shirt the soldiers who did the fighting were rarely

Cook was placed in jail. [illegible] release him failed and the Am working on the Mexican railro cided to quit in a body. The St partment, also, got busy, Co man Scott having been reque Bourbon county people to p matter. Little progress seeme made, but efforts did not cea the release of Cook is the resu months he was ready to give bo the government, which owr roads, would not accept bail. gushed in prison, suffering in and mind and the news that he last been freed, if only bond, welcomed.

TO LEAVE IN MARCH

Rev. Ellett and Roy Boatr Engage in Evangelistic W

Rev. H. R. Ellett and Ro right who decided some time engage in evangelistic wor leave here March second. T first go to Independence, wh will assist in a meeting for [illegible] of days after which they wi to Sapulpa for a several wee ing. Mr. Boatright will hav of the singing and chorus w

---

WIFE WANTS $10,000 D

Mrs. Hattie Long Sues Fran for Loss of Her Husb

Mrs. Hattie Long today suit in the district court Frank Young for $10,000 da the loss of her husband w says died from the effects o received in an accident for defendant was responsible.

Mrs. Long lives at Petro her husband at the time of was oiler for the Kansas Na company. According to the Mr. Long, the plaintiff and ren were on the 18th of Dec driving along a public highw osho county, while Mr. Y his wife were driving in the rection, but in front of th Long carriage, the petit caught up with Young or when the latter who was in en road turned his team to In front of Long's team, bl way. Mr. Long's team sta denly and lunged to the carriage going into a ditch turning with Long beneath ter, so the petition says, r broken back and spine and the effects of the injury c 6th, 1910. Mrs. Long char and carelessness on the p defendant and asks for $1 ages.

CAMBRIDGE BANK
EPA7-001827

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Filename: 1910-07-16 Order and Lease.pdf

DOCUMENT INFO

IN THE DISTRICT COURT OF ALLEN COUNTY, KANSAS.

Trust Company of America, Trustee, Plaintiff,

v. No. 8464

Lanyon Zinc Company, et al, Defendants.

O R D E R.

On this 16th day of July, 1910, the receiver in the above-entitled action being present by his attorneys and the other parties to said action absent, upon application of said receiver and for good cause shown it is ordered that said receiver be and he is hereby authorized and directed to make and execute to the AMERICAN METAL COMPANY, a corporation, the proposed lease, copy of which is attached to his said application, leasing to said last-mentioned company the smelting plants and other property sold by the sheriff of Allen County at sheriff's sale on the 11th day of April, 1910 pursuant to the judgment and decree in this action; and it is further ordered that nothing herein nor in said lease shall operate to prejudice the rights of tenants who may have leased the dwelling houses, or any of them, composing a part of the above-mentioned property, either from the receiver or prior to his appointment as such, nor to the prejudice of persons who may have purchased dwelling houses or lots upon installment contract prior to the appointment of the receiver.

Cecil Foral

Judge.

EPA7-001828

IN THE DISTRICT COURT OF ALLEN COUNTY, KANSAS.

Trust Company of America, Trustee, Plaintiff,

v. No. 8787

Lanyon Zinc Company, et al, Defendants.

APPLICATION OF RECEIVER FOR ORDER TO LEASE PROPERTY.

Now comes James O. Rodgers as Receiver of Lanyon Zinc Company, one of the defendants, and shows to the court:

That as such receiver he is without sufficient capital to continue the proper operation of the zinc smelting plants and properties of Lanyon Zinc Company sold to one Charles H. Werner at sheriff's sale the 11th day of April, 1910 pursuant to the judgment and decree in the above-entitled action; that as such receiver he has an opportunity to lease said plants and property to the American Metal Company, a corporation, upon the terms set out in the lease submitted herewith, and a copy of which is attached to and made part of this application; that said Lanyon Zinc Company and the purchaser of said plants and properties at said sheriff's sale have requested him to cause said lease to be made and executed, the same being in the judgment of said company and of said purchaser to the best interest of all parties interested in said property.

WHEREFORE, your petitioner prays for an order authorizing him to execute and deliver said lease.

LANYON ZINC COMPANY,

By James O. Rodgers
Receiver.

State of Kansas,)
(ss.
County of Allen,)

JAMES O. RODGERS, of lawful age, being duly sworn on oath, says: That he has read the foregoing application and that the matters and things therein stated are true.

James O. Rodgers

Sworn to before me and signed in my presence this 16th day of July, 1910.

Myrtle A. Newman
Notary Public.

My commission expires July 9, 1914.

(SEAL)

EPA7-001829

- C O P Y -

INDENTURE OF LEASE, made this 16th day of July, 1910, by and between JAMES O. RODGERS, as Receiver of the Lanyon Zinc Company (hereinafter designated the "Lessor"), party of the first part and THE AMERICAN METAL COMPANY, a corporation organized and existing under the laws of the State of New Jersey (hereinafter called the "Lessee"), party of the second part:

W I T N E S S E T H: THAT

WHEREAS, the Lessor by virtue of an order of the District Court of Allen County, Kansas, made April 17th, 1909 was appointed Receiver of all the property of the Lanyon Zinc Company, a New Jersey corporation, in an action for the foreclosure of its first mortgage, brought by The Trust Company of America as Trustee for bondholders; and

WHEREAS, all of the property, real and personal, of the Lanyon Zinc Company pursuant to a judgment of foreclosure and sale in said action was sold on April 11th, 1910, but said Receiver has not yet been discharged and continues in possession of the smelting plants and other property so sold, but is without sufficient capital for the proper operation thereof;

NOW, THEREFORE, in consideration of the mutuality hereof, and of the payment of the rentals hereinafter agreed to be paid, James O. Rodgers, as Receiver as aforesaid, being thereunto duly authorized by order of the District Court of Allen County, Kansas, does hereby lease and demise unto The American Metal Company, all that certain property formerly of the Lanyon Zinc Company lying and situated in Allen County, in the State of Kansas, described as follows, to-wit:

— description inserted —

being the property and premises located in Allen County, Kansas, which came into his possession by virtue of his appointment as Receiver as hereinbefore mentioned.

This lease shall be for the term of six months' beginning at twelve o'clock midnight between the 15th and 16th days of July, 1910, with the right and privilege to The American Metal Company of terminating this lease at any time during said six months' period upon thirty days' written notice to the said Receiver, to be given to him either personally or by mail addressed to him at Iola, Kansas.

II. The American Metal Company hereby agrees that it will on the fifteenth day of each month, during the existence of this lease, pay to the said Receiver, as rental, the sum of one hundred dollars ($100) per month, with proportionate payments for fractions of a month.

III. The American Metal Company hereby agrees, as a further consideration for the making of this lease by the Receiver, that it will cause said Receiver to be released from his obligation to The American Metal Company, Limited, a New York corporation, for the smelting of approximately six thousand (6000) tons of ore now on the premises hereby leased and such additional amount of ore as may be en route, or contracted for by the said The American Metal Company, Limited. Nothing herein contained shall be construed as being intended to release, or procure the release of, the Receiver from any claim which The American Metal Company, Limited, may have against the Receiver growing out of the smelting by him heretofore of ores under the terms of his agreement with the said The American Metal Company, Limited.

IV. The American Metal Company further agrees that as additional rental it will pay to the Lessor such moneys as may, during the term of this lease, be needed by him for the payment of premiums payable on the insurance policies now in force or renewals thereof, on the

property and premises hereby leased.

V. The Lessee further covenants with the Lessor:

That it will make no substantial alterations in the buildings upon the said premises without the consent of the Lessor being first obtained in writing;

That the Lessor, or his agents, may at reasonable times enter upon the said premises to examine the condition of the same;

That it will, at the termination of this lease, quietly yield up the said premises in as good and tenantable condition in all respects, reasonable wear and use and damage by fire and other unavoidable casualities excepted, as the same now are.

VI. This agreement shall bind the several parties hereto and their successors and assigns.

IN WITNESS WHEREOF, the said Receiver has hereunto set his hand and affixed his seal, and the said party of the second part has caused its corporate name to be hereunto subscribed and its corporate seal to be affixed by its officers thereunto duly authorized the day and year first above written.

_____
As Receiver.

THE AMERICAN METAL COMPANY,

By J. LANGLOTH, Pres.

ATTEST: JULIUS GOLDMAN

_____
Secretary.

STATE OF NEW YORK, }
COUNTY OF NEW YORK, } ss.:

On this 8th day of July, one thousand nine hundred and ten before me, a Notary Public in and for said county and State, came Jacob Langloth to me personally known to be the same person who executed the foregoing agreement as President of The American Metal Company, and thereupon duly acknowledged the execution of the same as such President, and to be the act of the said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand andaffixed my seal on the day and the year first above written.

JULIUS LOEB
_____
Notary Public, New York County, NY.

(SEAL)

FOR VALUE RECEIVED, the undersigned, a corporation organized under the laws of the State of New York, does hereby guarantee the performance by The American Metal Company of the covenants and agreements hereinbefore contained on its part to be done and performed.

THE AMERICAN METAL CO., LIMITED,

By J. LANGLOTH, Pres.

ATTEST: JULIUS GOLDMAN,
Sectry.

(SEAL)

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Filename: 1910-09-17 Kirk Receiver.pdf

DOCUMENT INFO

IN THE DISTRICT COURT OF ALLEN COUNTY, KANSAS.

The Trust Company of America, Trustee, Plaintiff,

v. No. 8464.

Lanyon Zinc Company, a corporation, et al, Defendants.

REPORT OF J. B. KIRK AS RECEIVER OF LANYON ZINC COMPANY

FROM DATE OF HIS APPOINTMENT (SEPTEMBER 17, 1910)

TO AND INCLUDING JUNE 22, 1912.

Your petitioner, J. B. KIRK, shows to the court:

That on the 17th day of September, 1910 he was appointed by the above court, and duly qualified the 19th day of September, 1910 and ever since has been, Receiver of the property of Lanyon Zinc Company.

That his receipts and disbursements as Receiver as aforesaid from the date of his appointment to and including the 22nd day of June, 1912 are as follows:

1910.		Receipts.	Disbursements.
Sept. 22,	Amts. paid, through Campbell & Goshorn, as postage on report of receipts and disbursements of Jas. O. Rodgers former Receiver 44¢, and amt. paid to Jno. Kiernan as witness fee in case Vandegrift & Co. v Lanyon Zinc Co. et al $3.00,..		3.44
" 29,	Amt. received of H. Heil Chemical Co. in payment of account,.....	14.55	
" 29,	Amt. paid, through Campbell & Goshorn, to Myrtle A. Newman fees as notary for taking deposition of Jno. Kiernan in case Vandegrift & Co. v Lanyon Z.Co. et al,.....		9.85
" 30,	Paid F. T. Davies salary as bookkeeper for September,.....		25.00
" 30,	Amt. paid Bessie Nadler salary as stenographer for September,.....		12.50
Oct. 5,	Amt. received of Clerk U.S. Cir. Court, by Campbell & Goshorn, as refund of cost deposit in case of Phillip H. Cass v Lanyon Z.Co.,....	31.20	
" 5,	Amt. expended, through Campbell & Goshorn in trip to St. Louis, Mo. to procure affidavit from employes of American Metal Co. for use in case Vandegrift & Co. v Lanyon Z.Co. et al,.....		3.99
" 7,	Amt. received of American Brake, Shoe & Foundry Co. in payment of		

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Oct.	14,	Amt. received of American Metal Metal Co. as rent to Oct. 15, 1910 under lease made by Jas. O. Rodgers as receiver,.....	100.00	
"	17,	Amt. paid Bessie Nadler salary as stenographer for half the month of October,.....		6.25
"	28,	Amt. received of Clerk U.S.Cir. Court thru Campbell & Goshorn as refund of costs advanced in case A.J. Whipple v Lanyon Z.Co. $3.20, and as refund of costs advanced in case Blodgett et al v Lanyon Z.Co. 80¢,.....	4.00	
"	31,	Amt. paid to F.T. Davies salary as bookkeeper for October, 1910 $25.00 and amt. paid Bessie Nadler salary as stenographer for last half of October $6.25,.....		31.25
Nov.	1,	Amt. paid Campbell & Goshorn on salary as counsel to the Receiver for last half September,.....		100.00
"	1,	Amt. paid Campbell & Goshorn salary as counsel to Receiver for October,.....		125.00
"	2,	Amt. paid to American Sash & Door Company in full of claim,.....		24.02
"	16,	Amt. received of American Metal Co. as rent to Nov. 15, 1910 under lease made by Jas. O. Rodgers Receiver,.....	100.00	
"	16,	Amt. paid Bessie Nadler salary as stenographer first half Nov,...		6.25
"	26,	Amt. paid thru Campbell & Goshorn as expense trip of Goshorn to Kansas City, Mo. to cross examine at taking of deposition of Wm. G. Junod for use in case Vandegrift & Co. v Lanyon Z.Co,.....		6.00
"	30,	Amt. received of Merchant & Evans in payment of account,.....	935.76	
Dec.	1,	Amt. paid Bessie Nadler salary as stenographer last half November $6.25, F.T. Davies salary as bookkeeper for Nov. $25.00, Campbell & Goshorn salary as counsel to Receiver for Nov. $125.00,.....		156.25
"	2,	Amt. returned by American Sash & Door Co., same having been paid to them thru Campbell & Goshorn by mistake,.....	24.02	
"	3,	Amt. paid to Smith & Travis, Agents, as premium on bond of J.B. Kirk Receiver,.....		25.00
"	6,	Amt. paid to Wm. G. Junod for copy of statement of customs duties paid thru him, for use in case Vandegrift & Co. v Lanyon Z.Co.,.....		4.00
"	10,	Amt. received of Link Belt Co., on account,.....	.65	
"	15,	Amt. paid Bessie Nadler salary as stenographer first half Dec.,..		6.25

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May 31,	Amt. paid Campbell & Goshorn salary as counsel to the Receiver for May,.....		100.00
June 12,	Amt. paid, thru Campbell & Goshorn, to Clerk U.S.Cir. Ct. for certificate in matter of release of bond given by Lanyon Z.Co. in case Brown et al v Lanyon Z.Co. et al,.....		1.03
" 30,	Amt. paid Campbell & Goshorn salary as counsel to Receiver for June,.....		100.00
July 1,	Amt. received of American Metal Co. as rent from Dec. 15 to Dec. 26, 1910 under lease made by Jas. O.Rodgers,Receiver,.....	18.33	
" 31,	Amt. paid Campbell & Goshorn salary as counsel to Receiver for July,.....		100.00
Sept. 7,	Amt. paid Campbell & Goshorn salary as counsel to Receiver for August,.....		100.00
" 27,	Amt. received of Jas. O.Rodgers former Receiver, being unclaimed wages of sundry employes,.....	15.05	
" 30,	Amt. paid Campbell & Goshorn salary as counsel to Receiver for September,.....		100.00
Oct. 6,	Amt. paid Smith & Travis as premium on bond of J.B.Kirk as Receiver,.....		25.00
Nov. 1,	Amt. paid Campbell & Goshorn salary as counsel to Receiver for October,.....		100.00
Dec. 1,	Amt. paid Campbell & Goshorn salary as counsel to Receiver for November,.....		100.00
" 13,	Amt. paid M.E. Fullenwider, Court Stenographer, for transcript of evidence in case Vandegrift & Co. v Lanyon Z.Co. et al,.....		87.64
" 22,	Amt. received of Merchant & Evans for 1881 lbs. sheet zinc,.....	127.44	
" 26,	Amt. borrowed for use in payment of premium on appeal bond in case Vandegrift & Co. v Lanyon Z.Co. et al,.....	113.00	
" 29,	Amt. paid, through Northrup Nat. Bank, to National Surety Co. as premium on appeal bond given by Lanyon Z.Co. et al,.....		113.00
" 31,	Amt. paid Campbell & Goshorn salary as counsel to Receiver for December,.....		100.00
1912.			
Jan. 9,	Amt. paid City Transfer Co. as drayage on part of books used in case Vandegrift & Co. v Lanyon Z.Co. et al, from Campbell & Goshorn's office to smelter,.....		.50
" 31,	Amt. paid Campbell & Goshorn		

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DOCUMENT INFO

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Filename: 1911 Mineral Resources of US- Zinc Smelters.pdf

DOCUMENT INFO

J.C. Branner.

et

DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

MINERAL RESOURCES

OF THE

UNITED STATES

CALENDAR YEAR

1911

PART I—METALS

WASHINGTON

GOVERNMENT PRINTING OFFICE

1912

EPA7-001835

ZINC.

By C. E. SIEBENTHAL.

INTRODUCTION.

An estimate of the production of primary [1] spelter in 1911 was given out in the form of a press bulletin on January 2, 1912. This was based on reports from every smelter and gave the actual production for the first 11 months with an estimate for the remainder of the year. The total thus obtained was about one-half of 1 per cent in excess of the final figures which were given in the advance statement of spelter production and consumption published February 9, 1912.

In July, 1911, a midyear census was taken of the production of spelter during the first six months of the year, and the results were given out in the form of a press bulletin. This plan was so well received by producers and others that it will be a feature of the future zinc reports, as it was formerly, from 1892 to 1901, inclusive. The production for the semiannual periods of 1911 is given on a later page.

The present report includes the final figures as given out in the advance statement and contains in addition tables of imports and exports of spelter and of zinc ore, a comparison of mine and smelter returns, a list of zinc smelters, a brief review of the advance in metallurgy and ore dressing as applied to zinc ores, and finally a summary of the domestic and foreign conditions of the zinc industry.

The statistics of production in this country have been compiled by the United States Geological Survey from confidential reports by each zinc smelting company in operation during 1911, except one small plant, using both ore and skimmings, which refused to report. For this company a close estimate of the spelter made from ore, amounting to only a few hundred tons, has been obtained. Statistics of the recovery of secondary zinc were collected from all the important secondary smelters and refiners. The statistics of domestic consumption are taken in part from the smelter returns and in part from the records of the Bureau of Statistics of the Department of Commerce and Labor, and the tables for foreign production and consumption were compiled from the sources indicated.

[1] In Mineral Resources for 1908, p. 461, zinc derived from ore was called "primary" spelter to distinguish it from the secondary spelter recovered from such sources as drosses, skimmings, and old metal. The former has also been called "virgin" spelter, and the latter has been called "remelted," "reclaimed," and "dross" spelter. The distinctive origin is more plainly suggested by the terms "primary" spelter and "secondary" spelter, and they are used herein. Where the word "spelter" is used without qualification primary spelter will be understood.

EPA7-001836

STATE OF ZINC INDUSTRY IN 1911.

The production of primary spelter from domestic ores in 1911 was 271,621 short tons, valued at $30,964,794, based on the average St. Louis price, as compared with 252,479 short tons, valued at $27,267,732, based on the average St. Louis price, in 1910.

The total production of spelter from both domestic and foreign ores in 1911 was the greatest in the history of the zinc-smelting industry of the United States, being 286,526 short tons, as against 269,184 tons in 1910, a gain of 17,342 tons, or 6.4 per cent. Along with this increase in production there was a large increase in the consumption, which was nearly 10,000 tons greater than the abnormal consumption of 1909. This resulted in diminishing the stocks at smelters over 14,000 tons. The imports of spelter reached the lowest figure in recent years, while exports, both foreign and domestic, increased about one-half over those of 1910. The total production of spelter in 1911 was equal to the output of 67,418 average retorts operating continuously throughout the year, or about 80 per cent of the effective smelting capacity at the beginning of the year, estimated as working upon 60 per cent zinc concentrates. During the year, however, several plants were dismantled, and in addition much low-grade ore was smelted, so that no doubt at the close of the year the high price of spelter stimulated production to the limit of capacity. The United States retained first place in the world's production of spelter with 29.3 per cent of the total output.

The exodus of zinc smelters from Kansas which began in 1910 kept up during 1911, and of the 16 plants with 47,214 retorts which were in existence at the close of 1910, but 10 plants with 31,378 retorts were left at the close of 1911. For several years, however, owing to the failure of supplies of natural gas, several of the plants had been idle or had operated at part capacity, so that the actual smelter output of Kansas for 1911 was nearly up to the average production of the last four years. The discovery of new gas fields in Oklahoma within piping distance of the newer, larger smelters in southern Kansas, the use of crude oil as fuel, and the remodeling of coal-burning smelters will doubtless result in sustaining the spelter output of Kansas for some time

PRODUCTION.

ANNUAL PRODUCTION, 1873–1911.

The production of spelter in the United States began in 1858 in an experimental way [1] and regular production began in 1860 at the Lehigh Zinc Works in the East and at the Matthiesson & Hegeler works in the West. Between 1864 and 1870 nine or ten other zinc smelters were established. Statistics of production are recorded for the years 1873 and 1875 and for the census year ending May 31, 1880. Annual statistics have been collected by the United States Geological Survey since 1882. The annual progress of the zinc-smelting industry since 1873 is shown in the following table.

[1] Ingalls, W. R., Lead and zinc in the United States, p. 314.

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Annual production of spelter in the United States from domestic and foreign ores, 1875–1911, in short tons.

Year.	From foreign ore.	From domestic ore.	Total.	Year.	From foreign ore.	From domestic ore.	Total.
1875		142	142	1896		81,499	81,499
1876		123	123	1897		99,280	99,280
1880		220	220	1898		115,399	115,399
1885		765	765	1899		129,051	129,051
1893		572	572	1900		123,886	123,886
1894		544	544	1901		140,822	140,822
1895		588	588	1902		156,227	156,227
1896		541	541	1903		159,219	159,219
1897		140	140	1904		[a] 186,702	186,702
1898		103	103	1905		[a] 203,849	203,849
1899		150	150	1906	26,076	199,694	234,770
1900		253	253	1907	26,115	223,745	249,860
1901		173	173	1908	19,675	190,749	210,424
1902		160	160	1909	25,535	230,225	255,760
1903		322	322	1910	16,705	252,479	269,184
1904		128	128	1911	14,905	271,621	286,526
1905		180	180				

[a] Including an unknown quantity smelted from foreign ore, small in 1904 but larger in 1905.

PRODUCTION BY STATES.

Production of primary spelter in the United States in 1906–1911, apportioned according to source of ore, in short tons.

Source.	Quantity.						Percentage of total in 1911.
	1906	1907	1908	1909	1910	1911	
Arizona	64	77	152	2,852	2,594	2,476	0.91
Arkansas	1,801	1,911	2,002	135	286	386	.14
California		140	27			959	.35
Colorado	32,456	26,077	24,895	20,121	23,228	42,223	15.58
Idaho	578	2,508	581	901	2,454	3,180	1.17
Illinois	282	1,446	298	575	1,561	2,884	1.06
Iowa	201	220	516		40		
Kansas	8,902	13,850	8,628	9,185	10,220	6,843	2.52
Kentucky	335	358	341	22	29	205	.08
Maine		1					
Missouri	130,948	141,824	122,655	140,676	140,652	127,540	46.96
Montana	1,415		900	4,725	12,408	22,115	8.14
Nevada	1,768	1,662	398	826	1,516	1,506	.56
New Jersey	11,206	13,573	6,926	16,035	20,217	15,128	5.57
New Mexico	555	136	124	3,961	4,911	3,778	1.39
Oklahoma		719	2,235	3,009	2,297	2,247	.83
Tennessee	124	181	341	695	926	1,000	0.37
Texas	8	16					
Utah	2,449	1,972	262	5,960	7,221	7,004	2.58
Virginia	1,142	771	910	58	1,168	228	.08
Washington	7					12	
Wisconsin	11,057	15,273	17,538	20,381	19,752	31,809	11.71
Total from domestic ores	199,694	223,745	190,749	230,225	252,479	271,621	100.00
Foreign:							
Canada	201	545	2,425	978	3,204	1,898	
Mexico	24,875	25,570	17,250	24,557	13,401	13,307	
Total from foreign ores	26,076	26,115	19,675	25,535	16,705	14,905	
Grand total	234,770	249,860	210,424	255,760	269,184	286,526	

Two tabulations of the spelter production of the country for a period of years are given, one showing the locality from which the ores were derived, the other the locality in which they were smelted.

EPA7-001838

Each method has its special interests and advantages, depending on whether the viewpoint be that of producer or consumer, or that of resources.

The State totals as given are compiled entirely from confidential reports by each company engaged in smelting zinc ores in the United States in the year in question. Only primary spelter is here included, the recovery of secondary spelter being given in a later table.

The foregoing table shows the sources of all ores and concentrates smelted for spelter in the United States in 1906–1911 and the quantity of spelter actually derived from the ores from these respective sources. Statistics of production according to source of ore were not collected prior to 1906.

The subjoined table shows the localities in which spelter was made:

Production of spelter in the United States, 1873–1911, apportioned according to locality in which smelted, in short tons.

Year.	Illinois.	Kansas.	Missouri.	Oklahoma.	Eastern.	Southern.	Colorado.	Total.
1873								7,643
1875	6,675	600	4,650		3,906			a 15,833
1880 (census)	10,904	2,451	5,671		4,213			23,239
1882	18,201	7,366	2,500		5,698			33,765
1883	16,792	9,010	5,730		5,340			36,872
1884	17,594	7,859	5,230		7,861			38,544
1885	18,327	8,502	4,677		8,082			40,588
1886	21,077	8,932	5,870		6,762			42,641
1887	22,379	11,955	8,660		7,446			50,340
1888	22,445	10,432	13,485		9,561			55,903
1889	23,460	13,658	11,077		10,265			58,860
1890	25,343	15,199	13,127		9,114			63,683
1891	25,711	22,747	16,253		8,945	4,217		80,873
1892	b 27,883	24,715	16,867		9,582	4,913		87,208
1893	b 29,096	22,815	13,737		8,802	3,882		78,832
1894	b 25,772	25,588	11,902		7,400	1,376		75,328
1895	b 32,332	25,775	14,498		9,484	3,607		89,696
1896	b 30,173	20,759	14,401		8,139	2,427		81,499
1897	b 37,376	33,396	15,125		7,218	3,365		99,980
1898	b 41,403	40,132	19,533		8,631			115,309
1899	b 50,118	52,021	18,807		8,805			129,051
1900	b 53,750	62,136	14,741		8,259			123,886
1901	b 44,396	74,240	12,853		8,603			a 140,822
1902	b 47,496	86,564	11,367		12,180			a 156,927
1903	b 47,659	88,388	9,894		12,301		877	a 159,219
1904	46,740	107,048	12,550		14,893		4,871	a 186,702
1905	46,106	114,287	11,444		24,513		6,599	a 203,849
1906	47,389	120,564	11,077		20,930		5,200	224,770
1907	50,156	134,106	15,732	5,035	37,626		5,303	249,960
1908	51,344	99,298	10,301	14,864	32,738		3,079	210,424
1909	62,153	103,299	7,937	28,782	42,941		6,048	255,760
1910	73,338	105,697	5,571	34,760	43,606		6,813	269,184
1911	65,130	98,413	4,116	46,315	47,155		7,397	268,526

a Secondary spelter included: 600 tons in 1875; 2,716 tons in 1901; 2,675 tons in 1902; 3,902 tons in 1903; 3,300 tons in 1904; and 1,469 tons in 1905.
b Includes also the production of smelters in Indiana.

Owing to the fact that this chapter can not be prepared for publication until the latter part of the year and after the figures of the mid-year spelter statement are available, those figures were utilized in the following table of production by States for six-month periods,

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though they include one period in advance of the volume for the year:

Production of spelter in the United States, 1911–12, by six-month periods, apportioned according to locality in which smelted, in short tons.

State.	Jan. 1 to June 30, 1911.	July 1 to Dec. 31, 1911.	Jan. 1 to June 30, 1912.
Illinois	41,255	41,875	44,224
Kansas	50,574	47,539	52,485
Oklahoma	19,997	26,318	36,010
All other States	28,370	30,298	33,777
Total	140,196	146,330	168,496

The following curves show graphically the production and consumption of spelter in the United States in the period for which

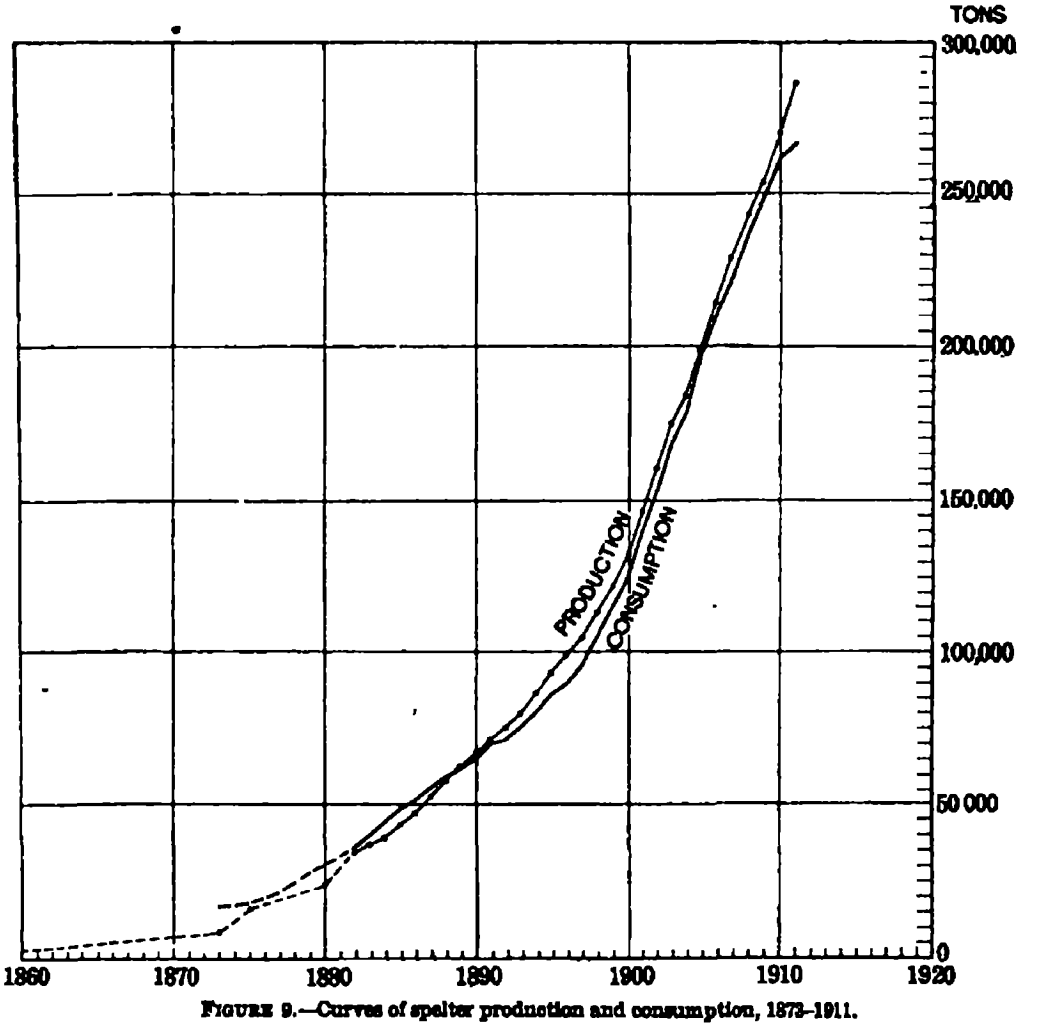

FIGURE 9.—Curves of spelter production and consumption, 1873–1911.

there is record. The curves are made up of 9-year averages, that is, the point in the curve representing each year is the average of the actual quantity for the year as well as of the four years preceding and

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the four years following that year. This method practically eliminates the effects of temporary factors, affecting the production or consumption for one or two consecutive years. The resulting curves therefore approach the true curves of normal production and consumption. Naturally the smoothing effects of the method are less pronounced near the ends of the curves, which remain more or less irregular. No distinction is made between spelter of domestic and of foreign origin in this table. From the beginning of the period until 1888 the average consumption exceeded production. Since that year the average production has always exceeded the average consumption. The consumption figures, as taken, disregard all stocks.

ZINC DUST.

Zinc dust is an impalpable powder which forms in the distillation of zinc when the zinc vapor is cooled too rapidly in the condensers or is diluted by too large a volume of other gas. It may constitute a large proportion of the metallic zinc obtained in electrothermic zinc smelting, but in ordinary retort smelting it usually amounts to between 3 and 10 per cent of the reduced zinc. The powder consists of metallic zinc, with about 10 per cent zinc oxide, which probably exists as a film surrounding the metallic particles. These particles can not be made to coalesce by heating unless under great pressure but must be again vaporized and condensed. Marketable zinc dust must not contain more than 10 per cent of zinc oxide and must pass through a screen of 100 meshes to the inch.

Zinc dust differs from metallic zinc in other physical properties, such as rapid oxidation, absorption of hydrogen, and generally greater chemical activity, resulting at times in spontaneous combustion or explosion. These properties are believed by Sang [1] to be due to conditions of stress resulting from rapid solidification, somewhat analogous to the condition in "Prince Rupert's drops."

These peculiar properties of zinc dust are the cause of many of its uses. Under the name of "indigo auxiliary" a paste of zinc dust is used to discharge locally the color in dyeing cotton goods, giving a white pattern on the background of dye. Zinc dust is used in fireworks and in making hydrogen for balloons. It is the basis of the various methods of dry galvanizing and is also used to furnish the zinc solution in electrozincing. One of the most important uses of zinc dust is as a substitute for zinc shavings in zinc precipitation in the cyanide treatment of gold and silver ores. For this purpose it is cheaper, quicker, more effective, and more convenient than zinc shavings and the saving in cost is about one-third.

In American zinc-smelting practice, heretofore, the zinc dust has been charged back into the retorts, since, under the former tariff, if sold as dust, it came into competition with foreign zinc dust admitted free of duty, whereas recovered as spelter it was protected by an import duty of 1½ cents per pound. Hence the small quantity of zinc dust heretofore used in this country has been imported from Belgium and Germany. The tariff act of 1909, as shown on a later page, established an import duty upon zinc dust of 1⅛ cents per pound.

[1] Sang, Alfred, Old and new methods of galvanizing: Proc. Eng. Soc. Western Pennsylvania, vol. 23, 1907, pp. 546-571.

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A new ruling of the Interstate Commerce Commission lists zinc dust and zinc flue dust as inflammable solids and directs that they must bear a yellow shipping label. Paragraph 1834 of the ruling covering this product reads as follows: "Packages must be tight and strong, and the interior packages must be so cushioned and secured that no rupture of either package can result from the ordinary shocks incident to transportation."

The United States Zinc Co. about the middle of 1910 began the preparation of zinc dust for market in the smelter at Pueblo, Colo. Press reports from Denver credit the plant with an initial daily output of 500 pounds of zinc dust which has later doubled in quantity. The market is mainly western, and the product is used for zinc-dust precipitation in cyaniding in South Dakota, Nevada, and elsewhere. The Grasselli Chemical Co., with zinc-smelting plants at Clarksburg and Meadowbrook, W. Va., also prepared zinc dust for market in 1911.

As there are but two producers the quantity and value of the output can not be disclosed, but it has been included in the zinc content of pigments in the following sections. For imports and prices, see under those headings in later sections of this report.

ZINC PIGMENTS.

There are four white pigments which have zinc for a base, either in whole or in part—zinc oxide, leaded zinc oxide, zinc-lead oxide, and lithopone. All of these may be and in the United States the first three usually are made directly from ore.

Zinc oxide is the most important of these pigments. In European practice the oxide is made from spelter, though in France zinc oxide is made from ore in the electrothermic furnace invented by Côte and Pierron. In the United States the oxide is generally made from ore, but in 1911 of the total production 3,922 tons was made from spelter, as compared with 3,627 tons in 1910. The production of zinc oxide in 1911 may not be disclosed. In 1910 it was 59,333 short tons, as compared with 68,974 tons in 1909 and with 57,237 tons in 1908. The imports for consumption of zinc oxide in 1911 were 2,780 short tons, and the exports for the same period were 14,618 short tons.

Leaded zinc oxide and zinc lead oxide are produced from ore, both in some cases at the same plant, the zinc-lead containing somewhat the larger percentage of lead. No zinc-lead oxide was made in 1910 or 1911. The production of leaded zinc pigment in 1911 may not be disclosed, but in 1910 it was 7,111 short tons.

Lithopone is an intimate mixture by chemical precipitation of zinc sulphide and barium sulphate. It may be manufactured from spelter or zinc oxide, but in the United States it is now generally made from zinc skimmings, ashes, and scrap.

The zinc content of the various zinc pigments made in the United States in 1911 from ore, both domestic and foreign, was 46,376 short tons as compared with 50,660 tons in 1910 and with 54,139 tons in 1909. The quantities given for 1910 and 1911 include the zinc contents of the zinc dust produced during those years, which can not be disclosed separately, there being at present but two producers.

For further details of the production of zinc pigments the reader is referred to the chapter on mineral paints in Part II of Mineral Resources for 1911.

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SECONDARY ZINC.

In the ordinary method of galvanizing, where the material to be coated is dipped into a bath of molten zinc, there is great loss of zinc in the form of semioxidized skimmings and of hard zinc drosses, caused by the alloy formed by the zinc with the iron of the tank and of the article being galvanized. In the larger galvanizing plants there are furnaces to refine these skimmings and drosses and to recover the spelter. There are also many small plants and some large ones which make a practice of buying galvanizers' skimmings and drosses and of recovering the spelter. A considerable quantity of old metal in the form of various alloys of zinc with copper and other metals is also worked over and brought up to the desired composition by the addition of new metal. At almost every brass foundry and machine shop in the country it is the custom to remelt and use brass filings, grindings, and scrap copper and brass, and it is manifestly impracticable to attempt to take full account of such material. Some of the zinc smelters running on ore find it advantageous to work in a quantity of secondary material. In such cases they have made the proper returns to the United States Geological Survey, and account has heretofore been taken of such production in these reports as dross or secondary spelter. As such spelter has been recovered by redistillation, it is practically indistinguishable in quality from spelter of ordinary grades made from ore. Several secondary smelters recovering zinc from drosses do so by redistillation. It has seemed advisable that the secondary spelter recovered by redistillation should be separated from that recovered by remelting and it has accordingly been done in the table below.

The successful operation of an electric furnace for the refining by redistillation of zinc drosses is described in the section on metallurgy on a later page.

Since 1907 statistics have been collected from the secondary smelters and refineries, for the first two years by the writer and since by J. P. Dunlop, of the United States Geological Survey. In 1907 and 1908 reports were obtained from the larger plants only, but in 1909 the scope of the canvass was greatly enlarged, since which time the number of firms has been increased from about 40 to double that number, with a large increase in reported production. The following table gives the production of secondary zinc in the United States, and a later table gives the production of secondary spelter in Europe:

Production of secondary zinc in 1907–1911, in short tons.

	1907	1908	1909	1910	1911
Secondary spelter, redistilled	7,050	7,159	9,273	12,784	14,043
Secondary spelter, remelted	11,791	9,811	23,767	28,439	26,470
Recovered zinc in alloys, excluding old brass remelted	1,417	665	1,181	2,709	3,223
Recovered zinc in remelted brass	(a)	(a)	8,204	18,450	24,110
Secondary zinc recovered as metal	20,258	17,635	42,425	62,382	67,846
Secondary zinc recovered in pigment	863	1,091	2,154	2,646	3,036
Secondary zinc recovered in zinc chloride [b]	4,411	4,500	3,839	3,970	3,865
Total secondary zinc	25,532	23,226	48,418	68,998	74,747

[a] Statistics not collected.

[b] These figures include only the quantity of zinc in zinc chloride used in wood preservation treatment, and were furnished by courtesy of the Forest Service, Department of Agriculture.

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Besides the increased recovery of secondary zinc as spelter and in alloys as shown in this table, there was increased use of zinc skimmings and drosses in the manufacture of zinc pigments and lithopone and about the same quantity in zinc chloride. The zinc content of pigments and lithopone made from secondary zinc in 1911 was 3,036 tons, as compared with 2,646 tons in 1910. The zinc content of zinc chloride manufactured from secondary zinc and used in the treatment of railroad ties, bridge timbers, etc., in 1911, is estimated at 3,865 tons, as against 3,970 tons in 1910.

E. W. Peters [1] has studied the benefits of the use of wood preservatives in mine timbers, and has made certain comparisons as to the relative cost and value of zinc chloride and creosote as preservatives. The following conclusions may be quoted here:

1. Decay is, in general, the agency most destructive to timber used in mines.
2. Although decay may often be retarded by peeling and seasoning, treatment with a suitable preservative is more effective.
3. The average life of green, unpeeled, and untreated loblolly pine gangway sets, under the conditions of the experiments discussed, was less than one and one-half years. Brush treatments with creosote and carbolineum increased this to three and four years, while impregnation treatments with zinc chloride and creosote left from 70 to 90 per cent of the timbers sound at the end of four years.
4. The use of treated timber results in a saving in the cost of maintenance of workings and a reduction in the amount of timber required and makes possible the utilization of inferior species of wood.
5. Brush treatments are economical when the amount of timber to be treated will not warrant the erection of a small open-tank or pressure plant, or when only a short increase in service is required.
6. The open-tank process is adapted to the treatment of small quantities of easily impregnated timber. When a large amount of material is to be treated, a pressure process should be used.
7. Mine timbers impregnated with zinc chloride and creosote oils have shown the best results. Up to the present, no difference in their durability has been noted.

As to cost of treatment, the differential is in favor of the zinc chloride. The Philadelphia & Reading Coal & Iron Co. found [2] the cost of sufficient zinc chloride to treat a set of timbers to be $0.52 as compared with $2.40, the cost of creosote. The expense of treatment being the same in each case, the total cost per set of treated timber installed in the mines was found to be $9.96 for the set treated with zinc as against $11.84 for the set treated with creosote.

The exports of zinc dross continue to decrease. They were 4,246 short tons in 1911 as compared with 4,724 tons in 1910, with 7,069 tons in 1909, with 8,405 tons in 1908, with 9,593 tons in 1907, and with 15,887 tons in 1906, thus supplementing the figures of increased recovery of secondary zinc. It is to be expected that exports of zinc dross will cease altogether in time, as the zinc content is normally worth more in this country than abroad because of the import duty on zinc.

[1] Peters, E. W., The preservation of mine timbers: Bull. U. S. Forest Service No. 107, 1912, p. 23.
[2] Idem, p. 15.

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COMPARISON OF STATE TOTALS, BASED ON SMELTER AND ON MINE REPORTS.

The foregoing figures of the production of spelter by the respective States are compiled from reports from individual zinc smelters. For several years the production of the more valuable metals in the Western States has been also obtained by the United States Geological Survey from reports of individual mines, and since 1907 this has been extended over the whole country. In order to put the spelter production on the same basis as the mine figures, all the zinc which is manufactured into pigment directly from ore (excluding the quantity in zinc oxide manufactured from spelter, the inclusion of which would entail its duplication in the totals) is added to the production of metallic zinc. The zinc dust recovered during the year is also included here. The zinc recovered from secondary sources is excluded, since it has already been once reckoned as spelter. These facts must be borne in mind in comparing this table with the table showing the production of spelter. The State totals obtained by each method are compared in the following table:

Comparison of State totals of production of zinc, 1908–1911, based on smelter and mine reports, in short tons.

State.	1908				1909			
	Totals based on smelter reports.	Totals estimated from mine reports.	Differences.		Totals based on smelter reports.	Totals estimated from mine reports.	Differences.	
			Smelter excess.	Mine excess.			Smelter excess.	Mine excess.
Arizona	152	339	.....	187	2,862	2,989	.....	127
Arkansas	2,002	605	1,397	.....	135	510	.....	375
California	27	0	27	.....	0	0	.....	.....
Colorado	29,907	15,065	14,842	.....	23,374	25,605	.....	2,231
Idaho	581	19	562	.....	901	676	225	.....
Illinois	298	1,717	.....	1,419	675	2,163	.....	1,488
Iowa	516	395	121	.....	0	35	.....	35
Kansas	8,628	14,119	.....	5,491	9,185	11,445	.....	2,260
Kentucky	341	0	341	.....	22	56	.....	34
Missouri	123,655	107,404	16,251	.....	140,811	130,162	10,649	.....
Montana	900	820	80	.....	4,725	4,680	45	.....
Nevada	398	558	.....	160	825	1,507	.....	682
New Jersey	47,643	67,165	.....	19,522	63,307	82,510	.....	19,203
New Mexico	616	1,788	.....	1,172	5,216	6,543	.....	1,327
Oklahoma	2,235	4,529	.....	2,294	3,008	7,806	.....	4,798
Tennessee	341	344	.....	3	695	596	99	.....
Texas	0	18	.....	18	0	0	.....	.....
Utah	282	730	.....	448	5,960	4,930	1,030	.....
Virginia	910	705	205	.....	58	58	.....	.....
Wisconsin	18,598	18,206	392	.....	21,414	23,152	.....	1,738
Total	238,030	234,526	.....	.....	283,173	305,423	.....	.....

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Comparison of State totals of production of zinc, 1908–1911, based on smelter and mine reports, in short tons—Continued.

State.	1910				1911			
	Totals based on smelter reports.	Totals estimated from mine reports.	Differences.		Totals based on smelter reports.	Totals estimated from mine reports.	Differences.	
			Smelter excess.	Mine excess.			Smelter excess.	Mine excess.
Arizona	2,594	2,742	.....	148	2,476	2,281	195	.....
Arkansas	286	994	.....	708	385	664	.....	279
California	0	0	.....	.....	959	1,404	.....	445
Colorado	25,883	38,545	.....	12,662	45,093	47,304	.....	2,211
Idaho	3,454	2,802	652	.....	3,180	4,170	.....	990
Illinois	1,551	3,549	.....	1,998	2,884	4,219	.....	1,335
Iowa	40	96	.....	56	.....	.....	.....	.....
Kansas	10,220	13,229	.....	3,009	6,843	10,272	.....	3,429
Kentucky	29	6	23	.....	205	158	47	.....
Missouri	140,653	128,589	12,064	.....	127,601	122,515	5,086	.....
Montana	12,417	15,819	.....	3,402	22,115	21,905	210	.....
Nevada	1,551	1,354	197	.....	1,618	1,774	.....	156
New Jersey	65,419	68,678	.....	3,259	53,413	77,445	.....	24,032
New Mexico	5,889	9,044	.....	3,155	3,813	5,119	.....	1,306
Oklahoma	2,297	6,394	.....	4,097	2,247	5,150	.....	2,903
Tennessee	925	966	.....	41	1,000	1,117	.....	117
Utah	7,288	8,184	.....	896	7,512	8,920	.....	1,408
Virginia	1,168	794	374	.....	314	[a] 1,113	.....	799
Washington	.....	.....	.....	.....	12	10	2	.....
Wisconsin	21,475	25,927	.....	4,452	33,359	29,720	3,639	.....
Total	303,139	327,712	.....	.....	315,029	345,260	.....	.....

[a] Includes a small quantity of zinc from New York.

The smelter State totals represent actual recovery and are found by summing up the total production reported by all companies for each State, respectively, all pigments being recalculated back to equivalent metallic zinc on the basis of average analysis of product. In compiling the mine totals each producing property is requested to report actual tonnage of zinc ores and concentrates shipped, and from this the zinc content is reckoned by assay value. From that zinc content 10 to 20 per cent, according to the character of the ore, is deducted for smelting losses, and the remainders thus obtained from all the producing properties in each State are combined to afford the totals for the respective States. Where the ore is concentrated at a custom mill, proper allowance is also made for the loss of metal in the process. It is clear that by either method the correctness of the totals is dependent upon complete and correct returns from each producing mine and smelter. It is further essential to the correctness of the mine totals that the assay content and the theoretical recovery be correctly estimated. Theoretically, the State totals, as compiled from smelter reports and from mine reports, respectively, should in the long run agree closely. As a matter of fact, for any year they show considerable divergence. These discrepancies, giving rise to "smelter excess" or "mine excess," may be the result of one cause or of a combination of causes, among which are: Lag in the smelting of the ore, resulting in accumulation of ore stocks at the smelters; lag in the mining, owing to which the smelter depletes its ore stocks; error in calculating metallic content from assay and in estimating recovery; and error by smelters in exact distribution of spelter, by States, according to source.

Of these sources, the greater discrepancies arise from erroneous distribution by the smelters, in particular as among the States in the

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Joplin region and in the upper Mississippi Valley region. Smelters using ore from the Joplin region are prone to credit it to Missouri because bought through their agents at Joplin. Similarly, in the upper Mississippi region the ore is likely to be credited to Wisconsin because bought through a Wisconsin buyer. In each region there are companies operating in more than one State but selling ore through a central office—a condition which likewise leads to error in distribution. Another cause for such error, particularly in the upper Mississippi region, is found in the electrostatic and electromagnetic separation plants, the ore from which is naturally credited to the State in which the plant is located.

The smelter reports give the exact annual production of zinc and serve as a check on the mine production, and they also give the form in which the zinc was recovered, whether as spelter or as pigment. The distribution among States by the smelter reports has value as a check on the mine State totals, and also because of the earlier publication, but for exact distribution of zinc production according to origin, recourse must be had to the mine production reports.

MINE AND SMELTER TOTALS, 1911.

The mine excess in Arkansas is due in part to erroneous distribution by smelters, ore from that State being probably attributed to Missouri. The mine excess in California is probably due to lag in smelting, as would naturally be expected in the case of a State just beginning zinc production. The mine excess in Colorado is very probably due to lag, as it is known that there are large stocks of zinc ore derived from Colorado now in the hands of smelting companies. The mine excess in Idaho, following four successive smelter excesses, probably represents the replenishment of depleted smelter stocks. The mine excess in Illinois is due to error in distribution by smelters, for which there are several causes, as outlined in the preceding page. The similar mine excesses in Kansas and Oklahoma are due to similar causes, the spelter made from ore from those States being credited to Missouri, which more than accounts for the large smelter excess in that State. The mine excess in New Jersey is partly accounted for by the zinc content of the 18,281 short tons of exported willemite ore. The mine excess in New Mexico, being the fourth successive mine excess, must be due to error, probably error in distribution by the smelters. The mine excesses in Utah and Virginia seem explicable as due to lag, and it is noted on a later page that some Utah zinc concentrates were held for a better price. The smelter excess in Wisconsin largely accounts for the mine excess in 1910.

RESOURCES.

UNITED STATES

MINE PRODUCTION OF ZINC.

The following table shows, for each zinc-producing State, the total quantity of zinc ore produced, and the output of each kind of zinc ore. The column headed "All other ore" includes lead ore, copper ore, copper-lead ore, and dry or siliceous ore, no zinc of consequence being recovered from any of these except in Colorado. "Dry" ores produced in that State in 1911 contained 2,497 short

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tons of recoverable zinc. The total crude ore yielding either gold, silver, copper, lead, or zinc is given for each zinc-producing State, so that a comparison may be made of the relative extent of deep mining operations for all five metals in these States, the amount of crude ore raised being the best measure for this purpose. The table discloses the fact that Missouri made nearly one-third of the crude ore production of the zinc-producing States, having an output of 12,136,788 short tons of crude ore, of which 8,162,076 tons was zinc bearing. Excluding iron ore, this was the largest production of metalliferous crude ore in the United States. Next in rank was Michigan, with 10,978,827 tons of crude copper ore.

The table gives also the quantity of recoverable zinc contained in the crude ores of each State and the quantity of zinc recovered from each kind of zinc ore. The percentage of recoverable zinc contained in the zinc ore and the zinc-lead ore of each State is also shown. The recoverable zinc content of crude zinc ore ranges from 31.7 per cent in Nevada down to 1.5 per cent in Missouri, the Western States having uniformly the higher percentage. The average recoverable zinc content of the zinc ore of the United States in 1911 was 2.7 per cent. Of the total mine production of zinc in 1911, a quantity corresponding to 89.5 per cent was derived from zinc ore, 9.8 per cent was derived from zinc-lead ore, and 0.7 per cent was recovered from all other ores. The figures of mine production of zinc are taken from the chapters on gold, silver, copper, lead. and zinc (mine production) in the various States appearing elsewhere in this volume.

Source of mine production of zinc in 1911, by States and kinds of ore, in short tons.

States.	Zinc ore.			Zinc-lead ore.			All other ore.		Total.	
	Crude ore.	Recoverable zinc content.	Per cent.	Crude ore.	Recoverable zinc content.	Per cent.	Crude ore.	Recoverable zinc content.	Crude ore.	Recoverable zinc content.
Arizona	[illegible]	1,797	11.2	10,756	490	4.5	4,540,277	4	4,567,129	2,291
Arkansas	[illegible]	684	2.7	.....	.....	.....	.....	.....	24,925	684
California	[illegible]	1,404	30.4	.....	.....	.....	2,939,503	.....	2,944,188	1,404
Colorado	[illegible]	25,695	23.2	214,385	19,112	8.9	2,052,706	2,497	2,377,936	47,304
Idaho	[illegible]	3,311	6.5	397,354	850	0.2	1,722,493	.....	2,170,897	4,170
Illinois	[illegible]	4,219	2.8	.....	.....	.....	.....	.....	a 153,313	4,219
Kansas	[illegible]	10,272	1.3	.....	.....	.....	.....	.....	781,465	10,272
Kentucky	[illegible]	158	3.2	.....	.....	.....	.....	.....	b 5,000	158
Missouri	[illegible]	122,515	1.5	.....	.....	.....	3,974,712	.....	12,136,788	122,515
Montana	[illegible]	21,867	9.7	128	38	29.7	4,714,580	.....	4,940,308	21,905
Nevada	[illegible]	975	31.7	4,654	799	17.2	4,126,064	.....	4,132,721	1,774
New Jersey	[illegible]	77,445	20.7	.....	.....	.....	.....	.....	374,084	77,445
New Mexico	[illegible]	1,102	12.1	16,233	4,017	24.6	207,964	.....	282,699	5,119
Oklahoma	[illegible]	5,150	2.3	.....	.....	.....	.....	.....	224,450	5,150
Tennessee	[illegible]	1,117	5.0	.....	.....	.....	581,974	.....	604,538	1,117
Utah	[illegible]	892	10.1	280,817	8,288	3.0	6,981,960	.....	7,268,530	8,920
Virginia	[illegible]	1,113	6.7	.....	.....	.....	.....	.....	a 16,704	1,113
Washington	.....	.....	.....	51	10	19.6	82,254	.....	82,305	10
Wisconsin	1,122,040	29,720	2.6	.....	.....	.....	.....	.....	1,122,040	29,720
Total	11,292,981	309,106	2.7	924,478	33,653	3.6	31,923,546	2,501	44,141,005	345,260
Per cent of total zinc derived from each kind of ore	89.5			9.8			0.		100.0	

a Exclusive of fluorspar ore mined in southern Illinois.
b Estimated.
c Includes also a little lead and zinc ore from New York.

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BRIEF REVIEW OF ZINC-PRODUCING DISTRICTS.

For details of production in the various zinc-producing districts of the country the reader is referred to the mine reports for the individual States, which appear elsewhere in this volume. This review is based on those reports or on notes furnished by the authors of the various reports. Only the general trend of development during the year will be here noticed in connection with the different districts.

EASTERN STATES.

New York became a producer of lead and zinc for the first time in several years. In St. Lawrence County a small shipment of lead ore was made from a vein near Gouverneur, and near Edwards the Northern Ore Co. developed a deposit of blende and pyrite and shipped to smelters a small tonnage of crude zinc ore. A 50-ton concentrator was in course of construction at the close of the year. Both zinc blende and pyrite will be marketed.

The chief zinc-producing district in the eastern part of the United States is the famous Franklin Furnace region of New Jersey, embracing the great zinc deposits of Sterling Hill and Mine Hill. The former was mined continuously from about 1875 until 1900, and the latter is making near its maximum yield after over 60 years of active mining. The production in 1911 was almost exactly the same as in 1910. Some diamond drilling was done at the Sterling Hill mine, and that mine will probably be reopened.

The Virginia-Tennessee area is the only other prominent zinc-producing region in the eastern part of the United States. The Virginia zinc mines made a larger output in 1911 than for several years, but it was mostly from tailings. The zinc carbonate and blende deposits of eastern Tennessee assumed considerable importance in 1909 and 1910, owing to the reopening of some old mines and the entry into the district of the Grasselli Chemical Co., which obtained control of several productive properties. In 1911 the American Zinc Co. of Tennessee, a subsidiary of the American Zinc, Lead & Smelting Co., took over the Holston mine at Mascot as well as other properties and by the close of the year had sunk the Mascot shaft to a depth of about 400 feet. The shaft will be continued to a depth of 1,000 feet and a 1,000-ton mill is under construction.

CENTRAL STATES.

The upper Mississippi Valley region, embracing the adjoining productive areas of Wisconsin, Illinois, and Iowa, made a fair gain in production of zinc concentrates over that of 1910. The gain made by Wisconsin was largely due to the greater output of the Benton district, which turned out nearly a third of the State product. The Galena district in Illinois also made a gain. The electrostatic plant of the American Zinc Ore Separating Co., at Platteville, Wis., and the rotary magnetic plant of the Joplin Separating Co., at Galena, were destroyed by fire late in the year, but the latter plant will be rebuilt and enlarged.

In the Kentucky-Illinois district a number of promising prospects were opened, from one of which several hundred tons of zinc carbonate were shipped. For several years prior to 1911 Kentucky has had

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no important output of zinc, for which condition two things are responsible, the difficulty of separating the zinc from the fluorspar with which it is generally associated and the stagnation in the fluorspar industry.

The Joplin region, embracing southwestern Missouri, southeastern Kansas, and northeastern Oklahoma, showed a loss of 7.5 per cent in zinc produced, as compared with the output of 1910. This was owing to the continued idleness of many of the sheet-ground mines of the Webb City district of Missouri, which shut down in 1910 on account of low ore prices, though both Kansas and Oklahoma show considerable loss in zinc produced as compared with 1910. The loss in the sheet-ground district was just about made up by the large output of the soft-ground mines of the new Thoms Station district north of Joplin. The improvement in ore prices during the latter half of the year led to the reopening of many of the sheet-ground mines, so that in 1912 they will probably have a normal production. In Kansas developments at Lawton and south of the Badger district as well as the renewal of old mining tracts about Galena offer the promise of larger production. In Oklahoma the deeper deposits at Miami are turning out well, and the higher ore prices have encouraged further operations at Quapaw.

Arkansas zinc production fell off just one-third, owing to the enforced idleness due to litigation, during the part first of the year, of the largest producer. The largest mill in the State was erected at the Morning Star mine, and extensive developments were made at the Philadelphia mine, so that 1912 should see an improvement in the production for the district.

The production of the Arbuckle Mountain region of Oklahoma remained about stationary, but developments were continued.

WESTERN STATES.

New Mexico decreased heavily in zinc production, the loss being over 40 per cent. The zinc-producing mines in 1911 were at Kelly, in the Magdalena district, Socorro County, and in the Pinos Altos and Central districts of Grant County.

Colorado's zinc production increased nearly one-fourth over that of 1910. Of the total, Lake County, including the Leadville district, produced 76 per cent. The output of zinc-carbonate ore increased from 8,059 tons in 1910 to 83,905 tons in 1911. This ore in 1910 was discovered to exist in large quantities in the old upper stopes formerly worked for lead carbonate and the sulphides. The high price of zinc in the latter part of 1911 led to great activity in the deposits of zinc carbonate to the neglect of the sulphides. The output of the latter fell off considerably, but partly on account of the closing of the Leadville mill of the American Zinc Extraction Co. at the mouth of the Yak tunnel. If the plan, now being formulated, to drain the Downtown district of Leadville by electric pumps is carried out, a large territory productive of zinc-carbonate ores will undoubtedly be opened.

Montana made a substantial increase in zinc from 15,819 tons in 1910 to 21,905 tons in 1911, having risen to this point from a production of about 100 tons in 1907. The increase in 1911 was due to better methods of concentration at the Basin works, leased by the

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Butte-Superior Co. to treat ore from the Black Rock mine at Butte, where 450 tons of ore were concentrated daily during 1911. The new 1,000-ton mill under construction at the mine of the Butte-Superior is described elsewhere in this report. The Elm Orlu lost its 350-ton concentrating plant, the Butte Reduction Works, by fire in October. Zinc concentrates from the Butte mines averaged 50 per cent of zinc and were concentrated from an ore averaging approximately 22.5 per cent of zinc.

In Idaho great gains have been made in the last few years in zinc from the mines in the Cœur d'Alene district of Shoshone County, which with Blaine County produced 4,170 tons of zinc in 1911, as compared with 2,802 tons in 1910, an increase of nearly 50 per cent. Zinc ore and lead-zinc ore was mined in seven properties of the Cœur d'Alene district. New concentrating equipment was added to the Success mill, the principal producer, and at the Morning mill the Macquisten flotation process was so successful in the recovery of zinc from blende-barite-siderite middlings that the flotation plant will be doubled in capacity.

Utah produced a slightly increased quantity of zinc, aggregating 8,920 tons, as against 8,184 tons in 1910. The output credited to the Daly-Judge mine in Wasatch County was less, owing to the reserve dump of zinc middlings having been entirely reconcentrated at the dry mill of the Grasselli Chemical Co. A large part of the new concentrate produced at the Daly-Judge mill was held for a better market. The Beaver County mines were inactive. Tooele County mines yielded an increased quantity from mines in the North Tintic district. Next in importance was the output of the Bingham mines in Salt Lake County.

Arizona mines had a somewhat smaller zinc production in 1911 than in 1910, the figures being 2,281 tons and 2,742 tons, respectively. Less zinc was produced in Mohave County than formerly. Cochise, Santa Cruz, and Yavapai counties were also producers. The new concentrator at the Needles, Cal., smelter went into operation during the year. It is equipped with Huff electrostatic separating machines.

Nevada's zinc output increased from 1,354 tons in 1910 to 1,774 tons in 1911. The output is almost altogether from Clark County and the gain was largely due to the new 60-ton concentration mill at the Yellow Pine mine. A new branch railroad connecting Goodsprings with the main line at Jean was finished during the year. The zinc ores are the oxidized forms, carbonates and silicates, with which occur lead carbonate, lead sulphide, and silver.

California had some production of zinc in 1907 and 1908, and a small quantity also in 1910, but the State has never been an extensive producer of the metal. The largest production ever made was in 1911, when the output reached 1,115 tons, almost altogether from Inyo County but with a small quantity from San Bernardino County. Most of the ore from which this metal was derived came from the old Cerro Gordo lead and silver mine in Inyo County. The ore so far shipped is the carbonate, running from 32 to 37 per cent zinc. Experiments are being continued at the Bully Hill copper mine, in Shasta County, with a view of utilizing the zinc ores found there, but thus far no production of this metal has been made.

Washington's production of zinc in 1911, the yield of the Oriole mine in the Metaline district of Pend Oreille County, was the first

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shipment to be recorded from that State. The ore was a sulphide with a siliceous gangue carrying gold, silver, lead, and a small quantity of copper.

MEXICO.

Zinc deposits are found in the Mexican States of Tamaulipas, Nuevo Leon, San Luis Potosi, Coahuila, and Chihuahua, but most of the ore imported into the United States has come from the two last mentioned.

Accurate figures of imports of zinc ore from Mexico are only to be had for the period since the tariff act of 1909 imposed a duty upon Mexican ore based upon the zinc content, thereby necessitating accurate weights and assays of the ore. The imports of zinc ore from Mexico in 1911 were 75,982 short tons, containing 30,693 tons of zinc, as compared with 82,657 tons, containing 40,434 tons of zinc in 1910, a falling off of 8 per cent in quantity of ore and of 24 per cent in zinc content, showing that the ore now imported is lower in grade than that imported in 1910. The ore for 1911 averaged approximately 40 per cent of zinc; that for 1910 averaged nearly 50 per cent of zinc. That the quantity of ore imported was not so great as in 1910 is doubtless due to the insurrection in Mexico. On account of the high price of spelter in the latter part of 1911, the lower grade ore previously unavailable on account of the tariff levied by the United States could be profitably mined and exported.

Certain changes in the Mexican railway tariffs, possibly designed in retaliation for the United States import duty, became effective at the beginning of the year. The new schedule increased the rate from the zinc districts of northern Mexico to the United States $1.08 per ton and lowered that to Gulf ports $0.27 per ton. The difference in freight rates added to the United States import duty led to the consignment of several experimental lots of zinc ore to European smelters in the early part of 1910, but as yet no satisfactory arrangements have been made for continuous shipments on a large scale.

CANADA.

The imports of zinc ore from Canada fell away from 10,024 short tons in 1909 to 4,749 tons in 1910 and 2,359 tons in 1911. This decrease was at first due probably to the tariff on zinc ore and to the low price of spelter in 1910. The decrease during the latter part of the period in the face of the prevailing high prices for spelter is to be attributed to the forest fires in British Columbia, which destroyed concentrating mills and transportation facilities.

The zinc ore produced in British Columbia now finds its way to the zinc smelters of the United States. In the past the output of these ores has not assumed great importance, but there is no doubt of their extended occurrence, and should commercial success attend the efforts at reduction the district would become an important zinc producer.

A strong endeavor is being made in the Dominion of Canada to develop a commercially successful method of reducing the complex zinc ores of the Kootenay district of British Columbia. The Dominion Government appropriated $50,000 for experimental work, a preliminary report upon which is summarized in a later section on metallurgy.

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AUSTRALIA.

The principal source of zinc in Australia is the silver-lead mines of Broken Hill, New South Wales. In the early days of Broken Hill mining the crude ore ran about 25 per cent each in lead and zinc and 25 ounces in silver, but by 1904 the average tenor had become reduced to 16 per cent each of lead and zinc with 11 ounces of silver to the ton. At present the average tenor is probably somewhat below those figures. In the effort to get rid of the zinc it was heaped up in enormous piles of zinc tailings and slimes from the concentrating plants, and lead concentrates with 20 per cent of zinc were smelted, lead slags averaging 16 per cent of zinc oxide with a maximum of 20 per cent having been run, according to Donald Clark.[1] Various leaching, electrolytic, and magnetic processes were successively tried and finally discarded for the flotation processes which have been in practical use since 1903. This method of concentration has the advantage that it can be applied to the current output of zinc tailings and slimes as well as to the accumulated stocks of those products.

The importance of flotation in that country is shown in the following table of the production of zinc concentrates at Broken Hill by flotation methods for the period 1907–1911, compiled from the annual reports of the department of mines of New South Wales. These concentrates are recovered from zinc middlings and tailings, both from the current product and from the stored accumulations of bygone years of milling operations. The minor quantities of lead concentrates recovered, as a table product from the zinc concentrates, are not included:

Production of zinc concentrates at Broken Hill, New South Wales, 1908–1911, in long tons.

Company.	Flotation process used.	1909		1910		1911	
		Tailings treated.	Concentrates.	Tailings treated.	Concentrates.	Tailings treated.	Concentrates.
Sulphide Corporation	Ballot	.....	92,408	.....	80,401	.....	78,822
Broken Hill Proprietary	Potter	171,172	53,042	279,150	69,855	422,511	103,378
Zinc Corporation	Ballot	227,502	84,608	270,637	85,625	331,486	103,630
Minerals Separation	do	193,842	62,022	240,143	79,288	105,397	33,058
Amalgamated Zinc (De Bavay's)	De Bavay	98,669	30,146	280,394	82,697	542,015	159,183
British Broken Hill	Elmore	.....	.....	33,428	9,622	.....	24,679
Broken Hill Block 10	do	.....	.....	3,300	965	.....	.....
Total concentrates produced.		.....	321,316	.....	397,866	.....	502,700
Average zinc content, per cent.		.....	45	.....	47.2	.....	46

In 1903 the department of mines of New South Wales estimated the tonnage of stored zinc tailings and other zincky residues at 5,687,400 long tons, containing an average of 18.6 per cent of zinc. In 1908 the stocks of zinc tailings were estimated by different authorities to amount to about 7,000,000 tons and to contain about 1,200,000 long tons of zinc, 350,000 tons of lead, and 40,000,000 ounces of silver. A correspondent of the Australian Mining Standard of April 6, 1910, puts the stock of tailings at 6,000,000 tons, the total capacity of the flotation plants when present plans are completed at about

[1] Clark, Donald, Australian mining and metallurgy, Melbourne, 1904, p. 372.

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31,000 tons weekly, and the current production of zinc tailings at 24,000 tons weekly. At this rate of excess of consumption over current production it would require about 16 years for the re-treatment plants to absorb the accumulated tailings. This estimate is contingent upon the continuation in the future of the present rate of production of the mines.

The following table compiled from the annual reports of the department of mines of New South Wales shows the quantity and zinc content of zinc concentrates exported from New South Wales from 1904 to 1911:

Exports of zinc (spelter and concentrates) from New South Wales, 1904–1911, in short tons.

Year.	Concentrates.	Zinc content.	Year.	Concentrates.	Zinc content.
1904	64,514	24,996	1908	309,044	127,515
1905	115,966	34,313	1909	418,778	161,300
1906	114,984	37,438	1910	524,862	207,085
1907	264,601	85,842	1911	578,343	213,231

METALLURGY.

CONCENTRATION AND SEPARATION.

A brief description of various ore flotation processes was given in Part I of Mineral Resources for 1908, pages 251–256, and to that summary the reader is referred for further information.

The Macquisten flotation plant installed in 1910 at the Morning mill of the Federal Mining & Smelting Co., at Mullan, Idaho, to treat zinc-barite-siderite middlings from the tables and vanners has been doubled in capacity. Originally consisting of 120 Macquisten tubes, a second unit, to utilize 128 tubes, was begun near the close of the year, and this when completed will more than double the capacity of the plant and enable it to handle 200 tons of feed per day.

A concentration plant of 40 tons capacity is under construction near Park City, Utah, to re-treat tailings from that district to recover their lead and zinc content. Wilfley tables and Macquisten flotation tubes are to be installed.

The complex nature of the zinc ores of the Butte district has made their successful concentration very difficult. The Butte & Superior Co., after adequate tests, decided to install the Hyde flotation process in the new concentrating plant to be erected at the mine during 1911–12. The essentials of the process as given herewith are furnished by the patent specifications (U. S. patent No. 922085):

The pulp is mixed with acid before thickening in a tank. It has been found that adding the acid in advance cuts down the amount required and promotes the settlement of colloidal material, which may be further aided, if necessary, by adding copperas, alum, or some other coagulant. From the thickener the pulp is pumped to the first-treatment tank, where oil is added and the entire mass agitated. A float concentrate is then taken off, and the gangue goes to the second-treatment tank, where the process is repeated, and thence to the third-treatment tank, where the pulp is agitated and a third concentrate taken off. From this tank the gangue is discharged as a final tailing.

There is considerable silica mixed with the first concentrates, so they are all recleaned in a second device, the concentrates from which are the final product, while the tailing is all sent back through the system again.

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The results of operation of the process are given in the Engineering and Mining Journal[1] for June 1, 1912, from which are taken the following notes regarding the concentration plant. The plant will consist of two units, each of 500 tons capacity and each equipped with crushing plant, jigs, hydraulic classifiers, a slime plant for oil flotation, and Wilfley tables, which are used only to separate the lead from the zinc. The ore is first reduced by rolls to six mesh, and after jigging the tailings are reground to 40 mesh and the tailings from the fine jigs ground to 100 mesh and treated by oil flotation. The pulp is thickened to three parts water and one part ore and is mixed with a small quantity of oil and sulphuric acid and agitated.

It is reported that all available zinciferous dumps and tailing piles in the Butte district are under lease to be worked by the Hyde process.

The electrostatic separating plant of the American Zinc Ore Separating Co., at Platteville, Wis., the first commercial plant using the Huff electrostatic machines, was destroyed by fire late in the year. Other electrostatic zinc-separating plants controlled by the same company are in operation at Sunnyside, near Silverton, Colo.; at Midvale, Utah; and at Needles, Cal.

SMELTING.

CHEMICAL AND ELECTROCHEMICAL REDUCTION.

The French Complex Ores Reduction Co. is operating, at Nelson, British Columbia, an experimental plant, trying out the process of ore reduction devised by A. Gordon French, which is thus described by the inventor:[2]

> The ore is crushed to pass one-twelfth of an inch mesh. Concentrates may be taken as they come from the mill and passed through a calcining furnace until almost sweet, and while still hot and in the furnace about 4 to 5 per cent of bisulphate of sodium, ordinary niter cake, which is a cheap waste product from sulphuric and nitric-acid manufacture, is mixed with the charge and after a few minutes the ore is withdrawn and allowed to cool. It is then transferred to leaching tanks and water slightly acidulated with a little niter cake is allowed to percolate through it. This dissolves all the zinc and manganese and leaves the whole of the lead, silver, iron, etc., in the residue in condition to be sent to the smelters. The zinc and manganese solution, which is very strong, is run into electrolytic tanks, where the former metal is deposited on the cathode plates as clean, pure spelter, and the latter as manganese dioxide on the anode plates. An important part of the process is this perfect separation of the zinc from the manganese. The manganese dioxide has a ready market and fetches a good price.
>
> The bisulphate of sodium used in the calcining and leaching operations is regenerated in the electrolytic tanks and goes round in a cycle so that very little requires to be bought, and, being a waste article, its first cost is very low.

ELECTROTHERMIC ZINC SMELTING.

The experimental work authorized by the Government of the Dominion of Canada in the hope of finding a reduction process for the complex zinc sulphide ores of British Columbia is proceeding at McGill University, Montreal, by Dr. Alfred Stansfield. A preliminary

[1] Eng. and Min. Jour., vol. 93, June 1, 1912, p. 1068.
[2] British Columbia Min. and Eng. Record, May, 1912, p. 299. Quoted from Nelson (B. C.) News.

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report by W. R. Ingalls, the consulting engineer, may be abstracted as follows:[1]

A large number of experiments have been made with several forms of furnaces, certain of which have been of rather elaborate construction, and with a variety of raw material.

Our early experiments were directed chiefly toward a discovery of the metallurgical conditions that have heretofore prevented a satisfactory condensation of zinc as molten spelter. While I can not say that these experiments have afforded us a complete explanation of these conditions, they have taught us a good deal, but in spite of the knowledge acquired, we have been so far unable to master the difficulties.

We have, indeed, produced some small quantities of spelter, and in certain experiments have condensed a fairly large proportion as molten metal, but we have not yet been able to do that at will.

Our experiments have thrown light upon the principles of furnace design and have led us to condemn several types that we have tried. Our work has indicated that in order to achieve any material improvement over the ordinary practice of zinc smelting, it is necessary to abandon certain features of the latter and contemplate continuous charging of the ore and reduction material and discharging the residuum without interfering with the process of distillation. These conditions introduce a multitude of perplexing difficulties that can be worked out only by tedious experimentation.

In a paper read before the Canadian Mining Institute, March 8, 1912, Mr. Ingalls advances the rather pessimistic conclusion that electrothermic zinc smelting has no future, except under special conditions of extraordinarily cheap power, etc., until the crucial point has been accomplished of reducing and distilling the zinc and condensing commercial proportions of the latter as spelter.

On the other hand, Dr. Joseph W. Richards,[2] in a description of the Johnson electric zinc furnace, says that in usual retort practice 20 to 30 per cent of the zinc distilled is caught as zinc dust and must be recharged, and that Johnson obtained better results than these in the condenser attached to his 25-kilowatt experimental electric furnace. However, Ingalls[3] says that in good retort practice the proportion of zinc dust formed varies from 5 to 10 per cent of the total zinc distilled over.

Weeks[4] has described the results of several trial runs of zinc dross in his arc-heat radiating electric furnace, in which 1,600 pounds of metallic zinc was recovered without the production of blue powder or zinc dust. In one run of 36 hours, 35 pounds of spelter were tapped per hour, the tap being limited by the size of the condenser, the furnace having the greater capacity. The refined zinc produced had an assay of:

Analyses of zinc dross and spelter refined therefrom in Weeks's electric furnace.

Zinc dross charged.	Per cent.	Refined spelter.	Per cent.
Iron	6.50	Iron	0.024
Lead	2.00	Lead	.666
Undetermined	6.00	Cadmium	.105
Zinc	85.50	Zinc (by difference)	99.205
	100.00		100.00

[1] Canadian Min. Jour., Oct. 15, 1911, pp. 668–669.
[2] Trans. Am. Electrochem. Soc., vol. 19, 1911, pp. 311–316.
[3] Ingalls, W. R., Metallurgy of zinc and cadmium, New York, 1906, p. 205.
[4] Weeks, C. A., Melting nonferrous metals in an electric furnace: Met. and Chem. Eng., vol. 9, July, 1911, pp. 363–365.

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The cost of treating zinc dross in this furnace is said to compare "more than favorably" with the cost of refining in retorts.

RETORT SMELTING.

F. L. Clerc[1] has proposed to smelt roasted zinc ores in large retorts 17 feet long by 20 inches wide, constructed of fire brick, having the bottom covered with a layer of molten copper, upon the surface of which reduction of the ore and distillation of the zinc takes place. Manifestly such a retort would work to best advantage only upon material in as pure state as possible, and the inventor specifies 75 per cent zinc content as about the minimum. To make the process of general use and of particular applicability to the lower grade carbonate ores of Leadville, which are not marketable in their present tenor and not susceptible of concentration by the usual means, Clerc has further proposed[2] that these zinc ores be subjected to igneous concentration in furnaces such as those of Wetherill, Lewis & Bartlett, the resulting zinc oxide to be reduced in the large retorts as described above and the residues from the furnaces, if valuable, to be smelted in lead or copper furnaces. In this connection it may be pointed out that the Bertha Mineral Co., a subsidiary of the New Jersey Zinc Co., has for several years been using such a concentration process to utilize tailings from the mill at Austinville, Va., and also low-grade zinc ores.

> The zinc oxide plant, consisting of 12 furnaces, has only recently been added, mainly for the purpose of utilizing the low-grade ore and tailings. After thorough testing the plant has proved entirely satisfactory. The grade of ore, including tailings, used for making the oxide, will run from 15 to 20 per cent metallic zinc. * * * At present the zinc oxide goes to the furnaces at Pulaski, where it is used for making spelter.[3]

In a still later paper Clerc[4] describes in greater detail the construction of the copper-bottomed retorts, their aggregation in furnaces of eight retorts with a common heating chamber, the construction of the condensers, and a device for preheating and feeding the charge consisting of briquets of ore and reducing material. He also points out that practically all of whatever of the precious metals have been volatilized in the igneous concentration and have passed over into the zinc oxide, will be collected in the molten copper of the zinc furnace.

ZINC SMELTERS.

The following table gives the zinc-smelting capacity of the United States as determined by a recent canvass. Those plants which have an "A" in the column headed "Acid plant" operate sulphuric-acid plants, either at the smelter or elsewhere as indicated in the footnotes.

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[1] Proc. Colorado Sci. Soc., vol. 10, 1911, pp. 85–98; also Met. and Chem. Eng., Aug. 1912.
[2] Eng. and Min. Jour., Jan. 13, 1912, pp. 127–131.
[3] Watson, T. L., Lead and zinc deposits o Virginia: Bull. Virginia Geol. Survey No. 1, 1906, pp. 139–140.
[4] Met. and Chem. Eng., Aug. 1912, pp. 463–467.

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List of active zinc smelters in the United States, showing capacity in 1911, by companies and States.

Company and State.	Location.	Acid plant.	Retorts at close of 1911.	Additional retorts contemplated in 1912.
COLORADO.				
United States Zinc Co	Pueblo		1,680	
ILLINOIS.				
American Zinc Co. of Illinois	Hillsboro	A		4,000
Collinsville Zinc Co	Collinsville		1,528	
Hegeler Bros	Danville	A	1,800	1,800
Illinois Zinc Co	Peru	A	4,640	
Matthiessen & Hegeler Zinc Co	La Salle	A	4,380	876
Mineral Point Zinc Co	Depue	A	4,520	
R. H. Lanyon Zinc & Acid Co	Hillsboro	A		1,600
Sandoval Zinc Co	Sandoval		996	
United Zinc & Chemical Co	Springfield	A[a]	3,680	
Total			21,544	8,276
KANSAS.				
American Zinc, Lead & Smelting Co	Caney		3,648	
Do	Dearing		3,840	
Bear, Sondheimer & Co	Altoona		3,300	
Chanute Zinc Co	Chanute		1,280	
Edgar Zinc Co	Cherryvale		4,800	
Granby Mining & Smelting Co	Neodesha		3,840	
Pittsburg Zinc Co	Pittsburg		910	
Prime Western Spelter Co	Gas		5,384	
L. Vogelstein & Co	do		2,520	
Do	La Harpe		1,856	
Total			31,378	
MISSOURI.				
Edgar Zinc Co	St. Louis		2,016	
Nevada Zinc Co	Nevada		672	
Total			2,688	
OKLAHOMA.				
Bartlesville Zinc Co	Bartlesville		5,184	
Do	Collinsville		1,280	1,920
Lanyon-Starr Smelting Co	Bartlesville		3,456	
National Zinc Co	do		2,380	
Tulsa Fuel & Manufacturing Co	Collinsville		3,320	1,920
Total			15,620	3,840
PENNSYLVANIA.				
New Jersey Zinc Co. (of Pennsylvania)	Palmerton		2,892	2,880
WEST VIRGINIA.				
Grasselli Chemical Co	Clarksburg	A[b]	5,760	
Do	Meadowbrook	A[b]	3,456	
Total			9,216	
Total for all States			85,018	14,996

[a] The United Zinc & Chemical Co. has zinc-roasting furnaces at Argentine, Kans., where the sulphur gases are utilized in an acid plant, the roasted concentrates being shipped to the smelter at Springfield, Ill.

[b] The Grasselli Chemical Co. operates acid plants in connection with its zinc-roasting furnaces at Grasselli, Ind., Cleveland, Ohio, and Newcastle, Pa., the roasted zinc concentrates being shipped to the smelters at Clarksburg and Meadowbrook, W. Va.

From the foregoing 85,018 retorts listed as in existence at the close of 1911 there should be subtracted 15,508 retorts at plants either idle during the year, or just completed at the close of the year, or engaged in smelting secondary material, leaving 69,510 retorts as active during the latter part of the year. At an average of 4½ tons

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of spelter per annum for each retort, this would give 295,418 tons as the active smelting capacity at the close of the year. Considering the quantity of low-grade ore smelted and the output for the year, 286,526 tons, it may be seen that the smelting capacity must have been crowded during the latter part of the year.

SMELTER CHANGES.

Three new smelters were completed during the year, the plant of the Grasselli Chemical Co., at Meadowbrook, W. Va., with 2,280 retorts; the plant of the Tulsa Fuel & Manufacturing Co., at Collinsville, Okla., a subsidiary of the Prime Western Spelter Co., with 3,320 retorts; and the plant of the Bartlesville Zinc Co., also at Collinsville, Okla., with 1,280 retorts. At the last two plants the designed retort capacity was not complete at the close of the year. The remaining retorts to complete these plants, as well as the additional retort capacity planned for other smelters during 1912, so far as decided upon at the beginning of the year, is indicated in the list of smelters. Additions to capacity at plants already in operation were 3,446 retorts, 1,600 being added in Illinois and 1,822 in Oklahoma. The old Cockerill smelter at Nevada, Mo., idle for several years, was put in order for operation by the Nevada Zinc Co., and started operation early in 1912. The Pittsburg Zinc Co., at Pittsburg, Kans., altered the roasting furnaces, substituting the Parkinson coal-fired furnace for the natural-gas furnaces previously used. According to published reports,[1] this has resulted in a considerable saving, the cost of roasting zinc ore with natural gas at 3 cents per 1,000 feet being $1.75 per ton of ore and the cost with the new process being $1 per ton. The remodeled plant started up again near the close of the year.

The smelters under construction at Hillsboro, Ill., by the R. H. Lanyon Zinc and Acid Co. and the American Zinc Co. of Illinois will be completed before the close of 1912 with the capacity as shown in the list. The Granby Mining & Smelting Co. is constructing a smelter, with 2,880 retorts and an acid plant, at East St. Louis, Ill. It is expected to be ready for operation late in 1913.

The Mineral Point Zinc Co. is building an addition to its smelter at Depue, Ill., which will more than double the capacity. The addition, early in 1913, of 4,560 retorts to the 4,520 retorts already in operation will give a total of 9,080 retorts in one plant, much the largest zinc smelter in the United States. The completion of this addition, and of the additions under construction at other plants, together with the new plant at Hillsboro and the new Granby plant at East St. Louis, will give Illinois a total of 37,260 retorts, as against 31,378 retorts now active in Kansas.

Among foreign zinc smelters, the plant of the Broken Hill Proprietary Co., at Port Pirie, South Australia, was completed in 1911, with 1,440 retorts, and as a result the spelter production of Australia increased from 560 short tons in 1910 to 1,904 short tons in 1911. The year book of the Metallgesellschaft is authority for the statement that a Belgian company has been recently formed under the title of Rothem Spelter Works, to establish a plant at Rothem, Belgium,

[1] Dunn, J. A., Fuel economy in zinc metallurgy, power production, and mining: Met. and Chem. Eng., vol. 10, August, 1912, pp. 498–499.

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DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

U.S. Bureau of Mines

MINERAL RESOURCES

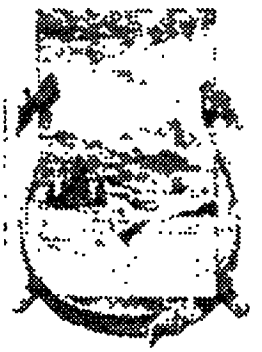
OF THE

UNITED STATES

CALENDAR YEAR

1912

PART I—METALS



WASHINGTON

GOVERNMENT PRINTING OFFICE

1913

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ZINC.

By C. E. Siebenthal.

INTRODUCTION.

An estimate of the production of primary[1] spelter in 1912 was given out in the form of a press bulletin on January 2, 1913. This was based on reports from every smelter and gave the actual production for the first 11 months with an estimate for the remainder of the year. The total thus obtained was about one-twentieth of 1 per cent less than the final figures which were given in the advance statement of spelter production and consumption published February 15, 1913. This very close agreement indicates the great care used by the smelters in making up their New Year estimates for the Survey and shows that, so far as the general production is concerned, the Survey's New Year figures, for all practical purposes, may be accepted as final.

In July, 1911, a mid-year census was taken of the production of spelter during the first six months of the year, and the results were given out in the form of a press bulletin. This plan has since been followed and has been so well approved by producers and others that it will hereafter be a feature of the Survey's zinc reports, as it was formerly, from 1892 to 1901, inclusive. The production by semiannual periods from 1911–1913 is given on a later page.

The present report includes the figures given out in the advance statement and contains in addition tables of imports and exports of spelter and of zinc ore, a comparison of mine and smelter returns, a list of zinc smelters, a brief review of the advance in metallurgy and ore dressing as applied to zinc ores, and finally a summary of the domestic and foreign conditions of the zinc industry.

The statistics of production in this country have been compiled by the United States Geological Survey from confidential reports by each zinc smelting company in operation during 1912, except one small plant using both ore and skimmings, which refused to report.

[1] In Mineral Resources for 1906, p. 461, zinc derived from ore was called "primary" spelter to distinguish it from the secondary spelter recovered from such sources as drosses, skimmings, and old metal. The former has also been called "virgin" spelter, and the latter has been called "remelted," "reclaimed," and "dross" spelter. The distinctive origin is more plainly suggested by the terms "primary" spelter and "secondary" spelter, and they are used herein. The terms have no reference whatever to the qualities of the product. Where the word "spelter" is used without qualification primary spelter will be understood.

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For this company a close estimate of the spelter made from ore, amounting to only a few hundred tons, has been obtained. Statistics of the recovery of secondary zinc were collected from all the important secondary smelters and refiners. The statistics of domestic consumption are taken in part from the smelter returns and in part from the records of the Bureau of Foreign and Domestic Commerce, of the Department of Commerce, and the tables for foreign production and consumption were compiled from the sources indicated.

STATE OF ZINC INDUSTRY IN 1912.

The production of primary spelter from domestic ores in 1912 was 323,907 short tons, valued at $44,699,166, based on the average St. Louis price, as compared with 271,621 short tons, valued at $30,964,794, based on the average St. Louis price, in 1911—a gain of 52,286 tons, equal to 19.2 per cent in quantity, and of $13,734,372, equal to 44.4 per cent in value.

The total production of spelter from both domestic and foreign ores in 1912 was the greatest in the history of the zinc-smelting industry of the United States, being 338,806 short tons, as against 286,526 tons in 1911, a gain of 52,280 tons, or 18.2 per cent. Along with this increase in production there was a large increase in the apparent consumption, which was more than 60,000 tons greater than the large consumption of 1911. This resulted in diminishing the stocks at smelters to 4,474 tons, the smallest stocks since 1906. The imports of spelter reached the highest figure in recent years, being over 10,000 tons greater than in 1911, while exports, both foreign and domestic, were less than in either of the two years preceding.

This condition was doubtless due to the generally prosperous state of the zinc industry, which resulted in an ascending scale of prices throughout the year and led to buying for future needs on the part of consumers. The normal stocks at smelters were thus converted into "invisible stocks" in the hands of the consuming interests, and the apparent consumption for the year doubtless greatly exceeds the actual consumption.

The total production of spelter is equivalent to the output of 79,719 average retorts operating continuously through the year on 60 per cent zinc concentrates. The retort capacity available for ore of the plants active in 1912 was, at the beginning of the year, 80,200 retorts. Many of them, of course, were used on low-grade ores, lessening their capacity. To these were added during the year 19,848 retorts, of which 2,880 were in Pennsylvania, 3,456 in West Virginia, 2,476 in Illinois, 10,796 in Oklahoma, and 240 in Colorado. Meanwhile there were slight reductions in capacity at certain plants, so that the total number of retorts available for smelting ore at the close of 1912 was 99,400. The large imports of spelter indicate that the active smelting capacity during the year was inadequate to the demands of a phenomenal apparent consumption. The United States retained first place in the world's production of spelter with 31.7 per cent of the total output.

The steady drain from Kansas smelting capacity for several years, owing to the failure of natural-gas fuel, has at last reduced that State

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to second place as a zinc-smelting center. Oklahoma now holds first place in active smelting capacity, with 27,416 retorts; Kansas is second, with 27,092 retorts; and Illinois third, with 25,148. The largest smelter is the Collinsville (Okla.) plant of the Bartlesville Zinc Co., with 8,064 retorts; the next largest is the Meadowbrook (W. Va.) plant of the Grasselli Chemical Co., with 6,912 retorts; and the third is the Collinsville (Okla.) plant of the Tulsa Fuel & Manufacturing Co., with 6,232 retorts. The Mineral Point Zinc Co.'s plant at Depue, Ill., will have 9,080 retorts when completed in 1913.

PRODUCTION.

ANNUAL PRODUCTION, 1873–1912.

The production of spelter in the United States began in 1858 in an experimental way[1] and regular production began in 1860 at the Lehigh Zinc Works in the East and at the Matthiesson & Hegeler works in the West. Between 1864 and 1870 nine or ten other zinc smelters were established. Statistics of production are recorded for the years 1873 and 1875 and for the census year ending May 31, 1880. Annual statistics have been collected by the United States Geological Survey since 1882. The annual progress of the zinc-smelting industry since 1873 is shown in the following table:

Annual production of spelter in the United States from domestic and foreign ores, 1873–1912, in short tons.

Year.	From foreign ore.	From domestic ore.	Total.	Year.	From foreign ore.	From domestic ore.	Total.
1873		7,343	7,343	1896		[illegible]99	81,499
1875		15,333	15,333	1897		60	99,960
1880		23,239	23,239	1898		1 00	115,309
1882		33,765	33,765	1899		1[illegible]61	129,061
1883		36,572	36,572	1900		1 86	123,896
1884		35,544	35,544	1901		1[illegible]22	140,522
1885		40,668	40,668	1902		1 27	156,227
1886		42,641	42,641	1903		1[illegible]19	150,219
1887		50,240	50,240	1904		a1[illegible]02	136,702
1888		55,903	55,903	1905		a5[illegible]49	203,849
1889		58,860	58,860	1906	25,076	1[illegible]94	224,770
1890		63,683	63,683	1907	26,115	2[illegible]45	249,860
1891		80,573	80,573	1908	19,673	1[illegible]49	210,434
1892		87,260	87,260	1909	25,535	1 26	255,760
1893		76,532	76,532	1910	16,705	2[illegible]79	200,184
1894		75,328	75,328	1911	14,905	2[illegible]21	285,526
1895		89,686	89,686	1912	14,909	3 07	338,506

a Including an unknown quantity smelted from foreign ore, small in 1904 but larger in 1905.

[1] Ingalls, W. R., Lead and zinc in the United States, p. 314.

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PRODUCTION BY STATES.

Production of primary spelter in the United States in 1906–1912, apportioned according to source of ore, in short tons.

Source.	Quantity.							Percentage of total in 1912.
	1906	1907	1908	1909	1910	1911	1912	
Arizona	64	77	152	2,862	2,594	2,476	4,092	1.26
Arkansas	1,801	1,911	2,002	135	286	385	604	.19
California	.....	140	27	.....	.....	959	1,672	.52
Colorado	32,456	26,077	24,885	20,131	23,238	42,233	60,841	18.78
Idaho	573	5,508	581	901	3,454	3,180	6,800	2.10
Illinois	282	1,446	206	675	1,551	2,894	3,962	1.22
Iowa	201	220	516	.....	40	.....	.....	.....
Kansas	8,902	12,880	8,528	9,185	10,220	6,843	5,668	1.75
Kentucky	235	358	341	22	29	205	394	.12
Maine	.....	1	.....	.....	.....	.....	.....	.....
Missouri	130,348	141,824	123,655	140,676	140,652	127,540	149,557	46.17
Montana	1,415	.....	900	4,725	12,408	23,115	14,196	4.38
Nevada	1,768	1,692	898	835	1,516	1,595	6,132	1.89
New Jersey	11,206	12,573	6,926	16,035	20,217	15,128	16,941	5.23
New Mexico	555	136	134	3,961	4,911	3,778	6,882	2.13
Oklahoma	.....	719	2,285	3,008	2,297	2,247	2,041	.63
Tennessee	124	181	341	695	925	1,000	1,935	.60
Texas	8	16	.....	.....	.....	.....	245	.08
Utah	3,449	1,972	282	5,960	7,221	7,004	7,756	2.39
Virginia	1,143	771	910	58	1,168	228	63	.02
Washington	7	.....	.....	.....	.....	12	.....	.....
Wisconsin	11,057	15,273	17,538	20,381	19,752	31,809	34,127	10.54
Total from domestic ores	199,694	223,746	190,749	280,225	262,479	271,631	323,907	100.00
Foreign:								
Canada	201	545	2,426	978	3,304	1,598	4,199	.....
Mexico	24,875	25,570	17,250	24,557	13,401	13,307	10,700	.....
Total from foreign ores	25,076	26,115	19,675	25,535	16,705	14,905	14,899	.....
Grand total	224,770	249,860	210,424	255,760	279,184	286,536	338,806	.....

Two tabulations of the spelter production of the country for a period of years are given, one showing the locality from which the ores were derived, the other the locality in which they were smelted. Each method has its special interests and advantages, depending on whether the viewpoint be that of producer or consumer or that of resources.

The State totals as given are compiled entirely from confidential reports by each company engaged in smelting zinc ores in the United States in the year in question. Only primary spelter is here included, the recovery of secondary spelter being given in a later table.

The foregoing table shows the sources of all ores and concentrates smelted for spelter in the United States in 1906–1912 and the quantity of spelter actually derived from the ores from these respective sources. Statistics of production according to source of ore were not collected prior to 1906.

The subjoined table shows the localities in which spelter was made.

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Production of spelter in the United States, 1873–1912, apportioned according to locality in which smelted, in short tons.

Year.	Illinois.	Kansas.	Missouri.	Oklahoma.	Eastern.	Southern.	Colorado.	Total.
1873								7,343
1875	6,678	600	4,650		3,308			a 15,833
1880 (census)	10,904	2,451	5,671		4,213			23,239
1882	18,201	7,366	2,500		5,698			33,765
1883	16,792	9,010	5,730		5,340			36,872
1884	17,594	7,859	5,230		7,861			38,544
1885	19,427	8,502	4,677		8,082			40,688
1886	21,077	8,932	5,870		6,762			42,641
1887	22,279	11,955	8,660		7,446			50,340
1888	22,445	10,432	13,455		9,561			55,903
1889	23,860	13,658	11,077		10,265			58,860
1890	26,243	15,199	13,127		9,114			63,683
1891	28,711	22,747	16,253		8,945	4,217		80,873
1892	b 31,383	24,715	16,667		9,582	4,913		87,260
1893	b 29,596	22,815	13,737		8,802	3,882		78,832
1894	b 28,972	25,588	11,992		7,400	1,376		75,328
1895	b 35,732	25,775	14,998		9,484	3,697		89,686
1896	b 36,173	20,759	14,001		8,139	2,427		81,499
1897	b 37,876	33,396	18,125		7,213	3,365		99,980
1898	b 47,103	40,132	19,533		8,631			115,399
1899	b 50,118	52,031	18,107		8,805			129,051
1900	b 38,750	62,136	14,741		8,259			123,886
1901	b 44,896	74,240	13,063		8,603			a 140,822
1902	b 47,096	86,564	11,087		12,180			a 156,927
1903	b 47,659	88,388	9,994		12,301		877	a 159,219
1904	47,740	107,048	12,150		14,893		4,871	a 186,702
1905	48,606	114,287	11,844		24,513		6,599	a 203,849
1906	47,989	129,564	11,077		29,930		6,260	224,770
1907	56,066	134,108	11,732	5,085	37,626		5,303	249,860
1908	50,244	99,228	10,201	14,864	32,738		3,079	210,424
1909	67,553	103,299	7,037	28,782	42,941		6,048	255,760
1910	73,038	105,697	5,571	34,760	43,606		6,512	269,184
1911	83,130	96,413	4,116	46,315	47,155		7,397	286,526
1912	88,397	101,104	7,085	76,925	56,252		9,043	338,806

a Secondary spelter included: 600 tons in 1875; 2,716 tons in 1901; 2,675 tons in 1902; 3,302 tons in 1903; 3,300 tons in 1904; and 1,469 tons in 1905.
b Includes also the production of smelters in Indiana.

Owing to the fact that this chapter can not be prepared for publication until the latter part of the year and after the figures of the mid-year spelter statement are available, those figures were utilized in the following table of production by States for six-month periods, though they include one period in advance of the volume for the year:

Production of spelter in the United States, 1911–1913, by six-month periods, apportioned according to locality in which smelted, in short tons.

State.	Jan. 1 to June 30, 1911.	July 1 to Dec. 31, 1911.	Jan. 1 to June 30, 1912.	July 1 to Dec. 31, 1912.	Jan. 1 to June 30, 1913.
Illinois	41,255	41,875	44,224	44,173	53,524
Kansas	50,574	47,839	52,485	48,619	42,645
Oklahoma	19,997	26,318	36,010	40,915	43,253
All other States	28,370	30,296	33,777	38,608	40,791
Total	140,196	146,330	166,496	172,310	180,213

The following curves show graphically the production and consumption of spelter in the United States in the period for which there is record. The curves are made up of 9-year averages; that is, the point in the curve representing each year is the average of the actual quantity for the year as well as of the four years preceding and the four years following that year. This method practically eliminates the effects of temporary factors affecting the production or

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consumption for one or two consecutive years. The resulting curves therefore approach the true curves of normal production and consumption. Naturally the smoothing effects of the method are less pronounced near the ends of the curves, which remain more or less irregular. No distinction is made between spelter of domestic and of foreign origin in this table. From the beginning of the period until 1888 the average consumption exceeded production. Since that year the average production has always exceeded the average consumption. The consumption figures, as taken, disregard all stocks.

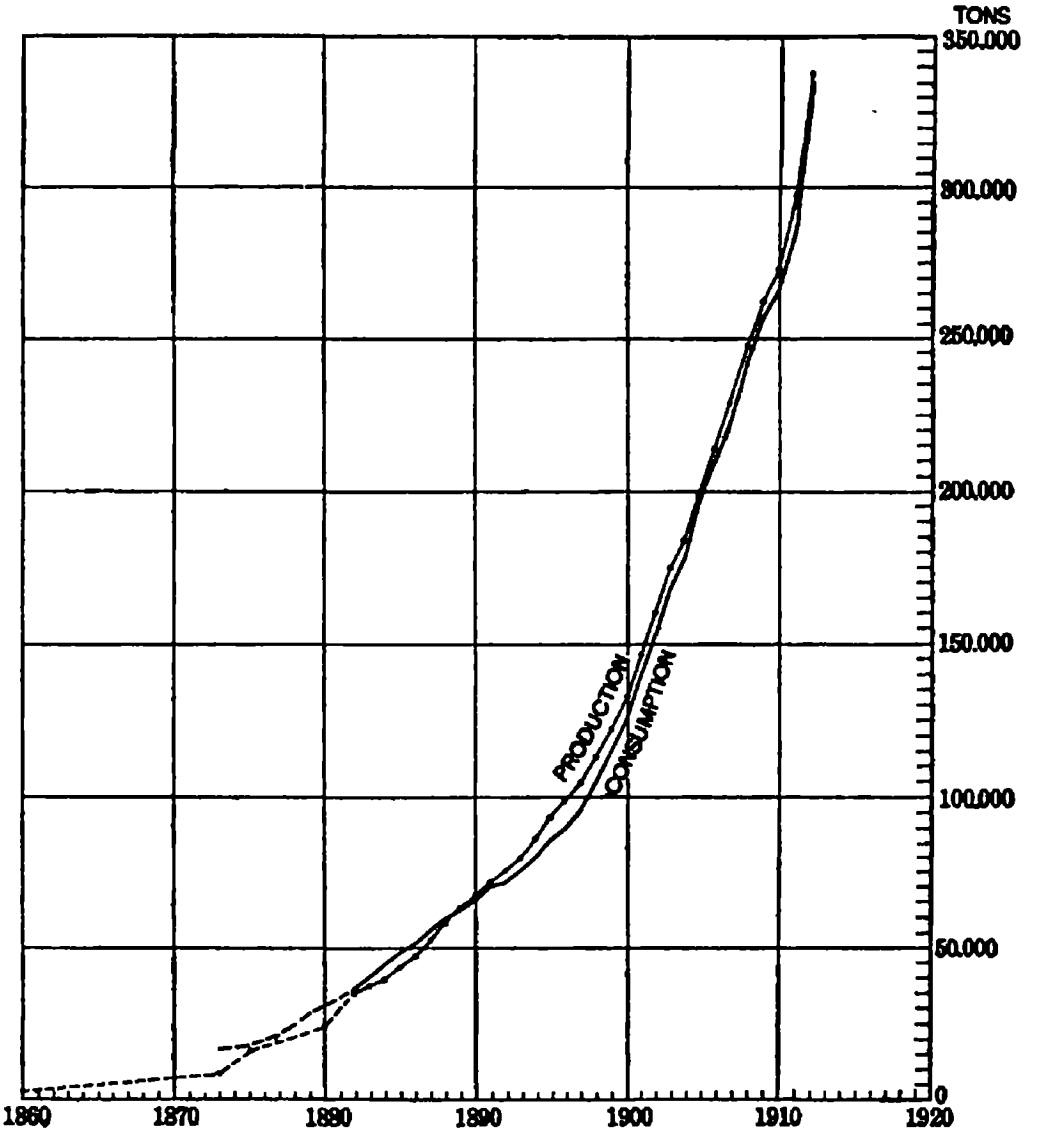

FIGURE 6.—Curves of spelter production and consumption, 1873–1912.

ZINC DUST.

Zinc dust is an impalpable powder which forms in the distillation of zinc when the zinc vapor is cooled too rapidly in the condensers or is diluted by too large a volume of other gas. It may constitute a large proportion of the metallic zinc obtained in electrothermic zinc smelting, but in ordinary retort smelting it usually amounts to between 3 and 10 per cent of the reduced zinc. The powder con-

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sists of metallic zinc with about 10 per cent zinc oxide, which probably exists as a film surrounding the metallic particles. These particles can not be made to coalesce by heating unless under great pressure, but must be again vaporized and condensed. Marketable zinc dust must not contain more than 10 per cent of zinc oxide and must pass through a screen of 100 meshes to the inch.

Zinc dust differs from metallic zinc in other physical properties, such as rapid oxidation, absorption of hydrogen, and generally greater chemical activity, resulting at times in spontaneous combustion or explosion. These properties are believed by Sang [1] to be due to conditions of stress resulting from rapid solidification, somewhat analogous to the condition in "Prince Rupert's drops."

These peculiar properties of zinc dust are the cause of many of its uses. Under the name of "indigo auxiliary" a paste of zinc dust is used to discharge locally the color in dyeing cotton goods, giving a white pattern on the background of dye. Zinc dust is used in fireworks and in making hydrogen for balloons. It is the basis of the various methods of dry galvanizing and is also used to furnish the zinc solution in electrozincing. One of the most important uses of zinc dust is as a substitute for zinc shavings in zinc precipitation in the cyanide treatment of gold and silver ores. For this purpose it is cheaper, quicker, more effective, and more convenient than zinc shavings, and the saving in cost is about one-third.

In American zinc-smelting practice heretofore the zinc dust has been charged back into the retorts, since under the former tariff if sold as dust it came into competition with foreign zinc dust admitted free of duty, whereas recovered as spelter it was protected by an import duty of 1½ cents per pound. Hence the small quantity of zinc dust heretofore used in this country has been imported from Belgium and Germany. The tariff act of 1909, as shown on a later page, established an import duty upon zinc dust of 1⅜ cents per pound, and the tariff act of 1913 changed this to 15 per centum ad valorem.

A new ruling of the Interstate Commerce Commission lists zinc dust and zinc flue dust as inflammable solids and directs that they must bear a yellow shipping label. Paragraph 1834 of the ruling covering this product reads as follows: "Packages must be tight and strong, and the interior packages must be so cushioned and secured that no rupture of either package can result from the ordinary shocks incident to transportation."

The United States Zinc Co. about the middle of 1910 began the preparation of zinc dust for market in the smelter at Pueblo, Colo. The market is mainly western, and the product is used for zinc-dust precipitation in cyaniding in South Dakota, Nevada, and elsewhere. The Grasselli Chemical Co., with zinc-smelting plants at Clarksburg and Meadowbrook, W. Va., also has prepared zinc dust for market since 1911.

As there are but two producers the quantity and value of the output may not be disclosed, but it has been included in the zinc content of pigments in the following sections. For imports and prices, see under those headings in later sections of this report.

[1] Sang, Alfred, Old and new methods of galvanising: Proc. Eng. Soc. Western Pennsylvania, vol. 23, 1907, pp. 546–571.

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ZINC PIGMENTS.

There are four white pigments which have zinc for a base, either in whole or in part—zinc oxide, leaded zinc oxide, zinc-lead oxide, and lithopone. All of these may be, and in the United States the first three usually are, made directly from ore.

Zinc oxide is the most important of these pigments. In European practice the oxide is made from spelter, though in France zinc oxide is made from ore in the electrothermic furnace invented by Côte and Pierron. In the United States the oxide is generally made from ore, but in 1912 of the total production, 5,959 tons were made from spelter, as compared with 3,922 tons in 1911. The production of zinc oxide in 1911 and 1912 may not be disclosed. In 1910 it was 59,333 short tons, as compared with 68,974 tons in 1909 and with 57,237 tons in 1908. The imports for consumption of zinc oxide in 1912 were 2,938 short tons, and the exports for the same period were 17,064 short tons.

Lead zinc oxide and zinc-lead oxide are produced from ore, both in some places at the same plant, the zinc-lead containing somewhat the larger percentage of lead. No zinc-lead oxide has been made since 1909. The production of leaded zinc pigment in 1911–1912 may not be disclosed, but in 1910 it was 7,111 short tons.

Lithopone is an intimate mixture by chemical precipitation of zinc sulphide and barium sulphate. It may be manufactured from spelter or zinc oxide, but in the United States it is now generally made from zinc skimmings, ashes, and scrap.

The zinc content of the various zinc pigments made in the United States in 1912 from ore, both domestic and foreign, was 62,876 short tons as compared with 46,376 tons in 1911, with 50,660 tons in 1910 and with 54,139 tons in 1909. The quantities given for 1910 and later years include the zinc contents of the zinc dust produced during those years, which may not be disclosed separately, there being at present but two producers.

For further details of the production of zinc pigments the reader is referred to the chapter on mineral paints in Part II of Mineral Resources for 1912.

SECONDARY ZINC.

In the ordinary method of galvanizing, where the material to be coated is dipped into a bath of molten zinc, there is great loss of zinc in the form of semioxidized skimmings and of hard zinc drosses, caused by the alloy formed by the zinc with the iron of the tank and of the article being galvanized. In the larger galvanizing plants there are furnaces to refine these skimmings and drosses and to recover the spelter. There are also many small plants and some large ones which make a practice of buying galvanizers' skimmings and drosses and of recovering the spelter. A considerable quantity of old metal in the form of various alloys of zinc with copper and other metals is also worked over and brought up to the desired composition by the addition of new metal. At almost every brass foundry and machine shop in the country it is the custom to remelt and use brass filings, grindings, and scrap copper and brass, and it is manifestly impracticable to attempt to take full account of such material. Some of the zinc smelters running on ore find it advantageous to work in a quantity of secondary material. In such cases they have made the

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proper returns to the United States Geological Survey, and account has heretofore been taken of such production in these reports as dross or secondary spelter. As such spelter has been recovered by redistillation, it is practically indistinguishable in quality from spelter of ordinary grades made from ore. Several secondary smelters recovering zinc from drosses do so by redistillation. It has seemed advisable that the secondary spelter recovered by redistillation should be separated from that recovered by remelting, and it has accordingly been done in the table below.

The successful operation of an electric furnace for the refining by redistillation of zinc drosses is described in the section on metallurgy on a later page.

Since 1907 statistics have been collected from the secondary smelters and refineries, for the first two years by the writer and since by J. P. Dunlop, of the United States Geological Survey. In 1907 and 1908 reports were obtained from the larger plants only, but in 1909 the scope of the canvass was greatly enlarged, since which time the number of firms has been increased from about 40 to double that number, with a large increase in reported production. The following table gives the production of secondary zinc in the United States, and a later table gives the production of secondary spelter in Europe:

Production of secondary zinc in 1907–1912, in short tons.

	1907	1908	1909	1910	1911	1912
Secondary spelter, redistilled	7,050	7,159	9,273	12,784	14,043	20,084
Secondary spelter, remelted	11,791	9,811	23,767	28,439	26,470	26,157
Recovered zinc in alloys, excluding old brass remelted	1,417	665	1,181	2,709	3,223	3,912
Recovered zinc in remelted brass	(a)	(a)	8,204	13,450	24,110	23,426
Secondary zinc recovered as metal	20,258	17,635	42,425	62,382	67,846	84,589
Secondary zinc recovered in pigment	863	1,091	2,154	2,646	3,036	4,619
Secondary zinc recovered in zinc chloride [b]	4,411	4,500	3,839	3,970	3,865	4,903
Total secondary zinc	25,532	23,226	48,418	68,998	74,747	94,111

[a] Statistics not collected.

[b] These figures include only the quantity of zinc in zinc chloride used in wood preservation treatment, and were furnished by courtesy of the Forest Service, Department of Agriculture.

Besides the increased recovery of secondary zinc as spelter and in alloys as shown in this table, there was increased use of zinc skimmings and drosses in the manufacture of zinc pigments and lithopone and about the same quantity in zinc chloride. The zinc content of pigments and lithopone made from secondary zinc in 1912 was 4,619 tons, as compared with 3,036 tons in 1911 and with 2,646 tons in 1910. The zinc content of zinc chloride manufactured from secondary zinc and used in the treatment of railroad ties, bridge timbers, etc., in 1912, is estimated at 4,903 tons, as against 3,865 tons in 1911 and 3,970 tons in 1910.

The exports of zinc dross fell of almost completely. They were 205 tons, as compared with 4,246 tons in 1911, with 4,724 tons in 1910, with 7,069 tons in 1909, with 8,405 tons in 1908, with 9,593 tons in 1907, and with 15,887 tons in 1906, thus supplementing the figures of increased recovery of secondary zinc. It was to be expected that exports of zinc dross would cease altogether in time, as the zinc content is normally worth more in this country than abroad because of the import duty on zinc.

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COMPARISON OF STATE TOTALS, BASED ON SMELTER AND ON MINE REPORTS.

The foregoing figures of the production of spelter by the respective States are compiled from reports from individual zinc smelters. For several years the production of the more valuable metals in the Western States has been also obtained by the United States Geological Survey from reports of individual mines, and since 1907 this has been extended over the whole country. In order to put the spelter production on the same basis as the mine figures, all the zinc which is manufactured into pigment directly from ore (excluding the quantity in zinc oxide manufactured from spelter, the inclusion of which would entail its duplication in the totals) is added to the production of metallic zinc. The zinc dust recovered during the year is also included here. The zinc recovered from secondary sources is excluded, since it has already been once reckoned as spelter. These facts must be borne in mind in comparing this table with the table showing the production of spelter. The State totals obtained by each method are compared in the following table:

Comparison of State totals of production of zinc, 1907–1912, based on smelter and mine reports, in short tons.

State.	1907				1908			
	Totals based on smelter reports.	Totals estimated from mine reports.	Differences.		Totals based on smelter reports.	Totals estimated from mine reports.	Differences.	
			Smelter excess.	Mine excess.			Smelter excess.	Mine excess.
Arizona	89	114	.....	25	152	339	.....	187
Arkansas	1,911	474	1,437	.....	2,002	605	1,397	.....
California	140	116	24	.....	27	0	27	.....
Colorado	33,644	26,394	7,250	.....	29,907	15,065	14,842	.....
Idaho	3,508	3,493	15	.....	581	19	562	.....
Illinois	1,468	737	731	.....	298	1,717	.....	1,419
Iowa	220	145	75	.....	516	395	121	.....
Kansas	13,850	17,772	.....	3,922	8,628	14,119	.....	5,491
Kentucky	385	0	385	.....	341	0	341	.....
Maine	1	0	1	.....	0	0	.....	.....
Missouri	142,024	116,752	25,272	.....	123,656	107,404	16,251	.....
Montana	0	122	.....	122	900	820	80	.....
Nevada	1,692	1,084	608	.....	398	558	.....	160
New Jersey	59,588	69,369	.....	9,781	47,648	67,165	.....	19,522
New Mexico	1,038	375	663	.....	616	1,788	.....	1,172
Oklahoma	719	1,657	.....	938	2,235	4,529	.....	2,294
Tennessee	181	109	72	.....	341	344	.....	3
Texas	16	22	.....	6	0	18	.....	18
Utah	2,447	2,726	.....	279	282	730	.....	448
Virginia	771	0	771	.....	910	705	205	.....
Wisconsin	16,984	18,490	.....	1,506	18,598	18,206	392	.....
Total	280,676	259,951	.....	.....	238,030	234,526	.....	.....

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Comparison of State totals of production of zinc, 1907–1912, etc.—Continued.

State.	1909				1910			
	Totals based on smelter reports.	Totals estimated from mine reports.	Differences.		Totals based on smelter reports.	Totals estimated from mine reports.	Differences.	
			Smelter excess.	Mine excess.			Smelter excess.	Mine excess.
Arizona	2,852	2,980	.....	127	2,594	2,742	.....	148
Arkansas	135	510	.....	375	286	994	.....	708
California	0	0	.....	.....	0	0	.....	.....
Colorado	23,374	25,605	.....	2,231	25,893	38,545	.....	12,652
Idaho	901	676	225	.....	3,454	2,902	552	.....
Illinois	675	2,163	.....	1,488	1,551	3,549	.....	1,998
Iowa	0	35	.....	35	40	96	.....	56
Kansas	9,185	11,445	.....	2,260	10,220	13,229	.....	3,009
Kentucky	22	56	.....	34	29	6	23	.....
Missouri	140,811	130,162	10,649	.....	140,653	128,589	12,064	.....
Montana	4,725	4,680	45	.....	12,417	15,819	.....	3,402
Nevada	825	1,507	.....	682	1,551	1,354	197	.....
New Jersey	62,307	82,510	.....	19,203	65,419	68,678	.....	3,259
New Mexico	5,216	6,543	.....	1,327	5,889	9,044	.....	3,155
Oklahoma	3,008	7,806	.....	4,798	2,297	6,394	.....	4,097
Tennessee	695	596	99	.....	925	966	.....	41
Texas	0	0	.....	.....	7,288	8,184	.....	896
Utah	5,960	4,960	1,000	.....	1,168	794	674	.....
Virginia	58	58	.....	.....	.....	.....	.....	.....
Wisconsin	21,414	23,152	.....	1,738	21,475	25,937	.....	4,462
Total	283,173	306,423	.....	.....	309,139	327,712	.....	.....

State.	1911				1912			
	Totals based on smelter reports.	Totals estimated from mine reports.	Differences.		Totals based on smelter reports.	Totals estimated from mine reports.	Differences.	
			Smelter excess.	Mine excess.			Smelter excess.	Mine excess.
Arizona	2,476	2,281	195	.....	4,092	4,379	.....	287
Arkansas	385	664	.....	279	604	748	.....	144
California	959	1,404	.....	445	1,672	2,173	.....	501
Colorado	45,088	47,304	.....	2,211	66,544	66,111	.....	567
Idaho	3,180	4,170	.....	990	6,824	6,953	.....	129
Illinois	2,884	4,219	.....	1,335	3,952	4,065	.....	113
Kansas	6,343	10,272	.....	3,429	5,668	10,633	.....	4,965
Kentucky	206	153	47	.....	394	491	.....	97
Missouri	127,601	122,515	5,086	.....	149,963	136,551	13,402	.....
Montana	22,113	21,903	210	.....	14,224	13,459	765	.....
Nevada	1,618	1,774	.....	156	6,271	6,661	.....	390
New Jersey	53,413	77,445	.....	24,032	70,444	69,755	689	.....
New Mexico	3,813	5,119	.....	1,306	7,635	6,783	852	.....
North Carolina	.....	.....	.....	.....	.....	142	.....	142
Oklahoma	2,247	5,150	.....	2,903	2,041	5,769	.....	3,728
Tennessee	1,000	1,117	.....	117	1,235	2,191	.....	956
Texas	.....	.....	.....	.....	245	119	126	.....
Utah	7,512	8,920	.....	1,408	8,220	8,534	.....	314
Virginia	314	a 1,113	.....	799	430	249	181	.....
Washington	12	10	2	.....	.....	.....	.....	.....
Wisconsin	33,389	29,720	3,669	.....	36,635	33,050	3,585	.....
Total	315,029	345,260	.....	.....	386,783	378,516	.....	.....

a Includes a small quantity of zinc from New York.

The smelter State totals represent actual recovery and are found by summing up the total production reported by all companies for each State, respectively, all pigments being recalculated back to equivalent metallic zinc on the basis of average analysis of product. In compiling the mine totals each producing property is requested to report actual tonnage of zinc ores and concentrates shipped, and from this the zinc content is reckoned by assay value. From that zinc

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content 10 to 20 per cent, according to the character of the ore, is deducted for smelting losses, and the remainders thus obtained from all the producing properties in each State are combined to afford the totals for the respective States. Where the ore is concentrated at a custom mill, proper allowance is also made for the loss of metal in the process. It is clear that by either method the correctness of the totals is dependent upon complete and correct returns from each producing mine and smelter. It is further essential to the correctness of the mine totals that the assay content and the theoretical recovery be correctly estimated. Theoretically, the State totals, as compiled from smelter reports and from mine reports, respectively, should in the long run agree closely. As a matter of fact, for any year they show considerable divergence. These discrepancies, giving rise to "smelter excess" or "mine excess," may be the result of one cause or of a combination of causes, among which are: Lag in the smelting of the ore, resulting in accumulation of ore stocks at the smelters; lag in the mining, owing to which the smelter depletes its ore stocks; error in calculating metallic content from assay and in estimating recovery; and error by smelters in exact distribution of spelter, by States, according to source.

Of these sources, the greater discrepancies arise from erroneous distribution by the smelters, in particular as among the States in the Joplin region and in the upper Mississippi Valley region. Smelters using ore from the Joplin region are prone to credit it to Missouri because bought through their agents at Joplin. Similarly, in the upper Mississippi region the ore is likely to be credited to Wisconsin because bought through a Wisconsin buyer. In each region there are companies operating in more than one State but selling ore through a central office—a condition which likewise leads to error in distribution. Another cause for such error, particularly in the upper Mississippi region, is found in the electrostatic and electromagnetic separation plants, the ore from which is naturally credited to the State in which the plant is located.

The smelter reports give the exact annual production of zinc and serve as a check on the mine production, and they also give the form in which the zinc was recovered, whether as spelter or as pigment. The distribution among States by the smelter reports has value as a check on the mine State totals, and also because of the earlier publication, but for exact distribution of zinc production according to origin, recourse must be had to the mine production reports.

MINE AND SMELTER TOTALS, 1912.

The mine excess in Kansas should be coupled with the mine excess in Oklahoma and is to be explained as due to the fact that spelter made from zinc ores from those States has been credited to Missouri by the smelters, and this likewise explains the large smelter excess in that State. The smelter excess in Montana, following a smaller one in 1911, probably represents depletion of smelter stocks and thus helps to dispose of the large mine excess in 1910. The smelter excess in New Jersey, following a mine excess in 1911, probably also represents depletion of stocks to that extent. The very considerable smelter excess in Wisconsin followed a similar smelter excess in

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1911, but in both 1909 and 1910 there were mine excesses, so that the present excess probably in part represents depletion of smelter ore stocks, but it may be due in part to spelter made from Illinois ore being credited erroneously to Wisconsin by the smelters, as explained above.

RESOURCES.

UNITED STATES.

MINE PRODUCTION OF ZINC.

The following table shows, for each zinc-producing State, the total quantity of zinc ore produced, and the output of each kind of zinc ore. The column headed "All other ore" includes lead ore, copper ore, copper-lead ore, and dry or siliceous ore, no zinc of consequence being recovered from any of these except in Colorado. "Dry" ores produced in that State in 1912 contained 2,265 short tons of recoverable zinc. This, as in other States, was concentrated from parts of the ore from certain counties, however, and was not distributed through the whole of the "All other ore" credited to Colorado in 1912. The total crude ore yielding either gold, silver, copper, lead, or zinc is given for each zinc-producing State, so that a comparison may be made of the relative extent of deep mining operations for all five metals in these States, the quantity of crude ore raised being the best measure for this purpose. The table discloses the fact that Missouri made over one-fourth of the crude ore production of the zinc-producing States, having an output of 13,385,511 short tons of crude ore, of which 9,321,145 tons was zinc bearing. Excluding iron ore, this was the largest production of metalliferous crude ore in the United States. Next in rank was Michigan, with 11,411,941 tons of crude copper ore.

The table gives also the quantity of recoverable zinc contained in the crude ores of each State and the quantity of zinc recovered from each kind of zinc ore. The percentage of recoverable zinc contained in the zinc ore and the zinc-lead ore of each State is also shown. The recoverable zinc content of crude zinc ore ranges from 33.4 per cent in California down to 1.5 per cent in Missouri, the Western States having uniformly the higher percentage. The average recoverable zinc content of the zinc ore of the United States in 1912 was 2.6 per cent as against 2.7 per cent in 1911. Of the total mine production of zinc in 1912, a quantity corresponding to 88.4 per cent was derived from zinc ore, 11 per cent was derived from zinc-lead ore, and 0.6 per cent was recovered from all other ores. The figures of mine production of zinc are taken from the chapters on gold, silver, copper, lead, and zinc (mine production), in the various States as indicated in the prefatory note to this chapter.

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Source of mine production of zinc in 1912, by States and kinds of ore, in short tons.

States.	Zinc ore.			Zinc-lead ore.			All other ore.		Total.	
	Crude ore.	Recoverable zinc content.	Per cent.	Crude ore.	Recoverable zinc content.	Per cent.	Crude ore.	Recoverable zinc content.	Crude ore.	Recoverable zinc content.
Arizona	22,321	3,828	17.2	4,190	551	13.2	6,813,571	.....	6,840,083	4,379
Arkansas	32,755	748	2.3	.....	.....	.....	.....	.....	32,755	748
California	6,472	2,160	33.4	.....	.....	.....	2,635,025	13	2,641,497	2,173
Colorado	177,946	42,495	23.9	229,107	21,339	9.3	2,169,573	2,277	2,576,626	66,111
Idaho	1,236	309	25.0	480,126	6,644	1.4	1,784,972	.....	2,266,334	6,953
Illinois	147,859	4,065	2.6	.....	.....	.....	.....	.....	[a]147,859	4,065
Kansas	744,254	10,633	1.4	.....	.....	.....	.....	.....	744,254	10,633
Kentucky	[b]12,000	491	4.1	.....	.....	.....	.....	.....	12,000	491
Missouri	9,321,145	136,551	1.5	.....	.....	.....	4,064,366	.....	13,385,511	136,551
Montana	136,552	13,431	9.8	91	28	30.8	5,415,521	.....	5,552,164	13,459
Nevada	7,394	2,108	28.5	20,054	4,553	22.7	4,736,517	.....	4,763,965	6,661
New Jersey	459,585	69,755	15.2	.....	.....	.....	.....	.....	459,585	69,755
New Mexico	16,394	4,012	24.5	15,792	2,771	17.5	1,320,100	.....	1,352,286	6,783
North Carolina	.....	.....	.....	1,215	142	11.7	14,858	.....	16,073	142
Oklahoma	293,500	5,769	2.0	.....	.....	.....	.....	.....	293,500	5,769
Tennessee	32,347	2,191	6.8	.....	.....	.....	603,229	.....	635,576	2,191
Texas	351	119	33.9	.....	.....	.....	20,757	.....	21,108	119
Utah	9,422	2,800	29.7	216,764	5,729	2.2	7,544,084	5	7,770,270	8,534
Virginia	2,132	236	11.1	2,803	[c]13	0.5	1,160	.....	6,095	[c]249
Wisconsin	1,363,636	33,050	2.4	.....	.....	.....	.....	.....	1,363,636	33,050
Total	12,787,301	334,751	2.6	970,142	41,770	4.3	37,123,733	2,295	50,881,176	376,516
Per cent of total zinc derived from each kind of ore		88.4			11.0			0.6		100.0

[a] This is exclusive of the fluorspar ore mined in southern Illinois from which a small percentage of lead is recovered in milling.
[b] Estimated.
[c] Not all the zinc recovered from the zinc-lead ore was sold during the year.

BRIEF REVIEW OF ZINC-PRODUCING DISTRICTS.

For details of production in the various zinc-producing districts of the country the reader is referred to the mine reports for the individual States indicated in the prefatory note. This review is based on those reports or on notes furnished by the authors of the various reports. Only the general trend of development during the year will be here noticed in connection with the different districts.

EASTERN STATES.

New York became a producer of lead and zinc in 1911 for the first time in several years. The Northern Ore Co., operating the Edwards mine in 1912, did development work and continued experimental work upon the 50-ton mill in the magnetic separation of blende and pyrite. It was found that dry separation was unsatisfactory and a wet magnetic process was being developed.

The chief zinc-producing district in the eastern part of the United States is the famous Franklin Furnace region of New Jersey, embracing the great zinc deposits of Sterling Hill and Mine Hill. The former was mined continuously from about 1875 until 1900, and the latter is making near its maximum yield after over 60 years of active mining. Though the production of crude ore was increased over that of 1911, the total recoverable zinc content fell off considerably in 1912.

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The Virginia-Tennessee area is the only other prominent zinc-producing region in the eastern part of the United States. The Virginia zinc mines had an output only about one-fourth as large in 1912 as in the preceding years. There were, however, some interesting developments, particularly in connection with the oxidized iron ores in Wythe County, where some zinc ore was recovered, and also in connection with the pyritic ores of Louisa County. The latter ores have always carried a certain quantity of lead and zinc, and at the Arminius mine the sulphide ores of these metals have at times been separated in a small way and shipped, though no shipments have been marketed in the last year or so. It is reported that very recently a new ore body has been struck at a depth of 1,000 feet, which consists of lead and zinc sulphides with a valuable silver content. It is further reported that other properties in line with the trend of these discoveries have been taken up by important zinc-smelting interests.

The zinc carbonate and blende deposits of eastern Tennessee assumed considerable importance in 1909 and 1910 owing to the reopening of some old mines and the entry into the district of the Grasselli Chemical Co., which obtained control of productive properties. In 1911 the American Zinc Co. of Tennessee, a subsidiary of the American Zinc, Lead & Smelting Co., took over the Holston mine at Mascot, as well as other properties, sank the Mascot shaft to a depth of about 400 feet, and began the construction of a 1,000-ton concentrating plant, which was completed in the first half of 1913. Notes on the equipment of this mill will be found under the heading "Metallurgy." Development work is reported to have proved up a large body of zinc ore, which is free from iron and lead and consequently suitable for the highest grade of spelter. An interesting discovery of the year was that of zinc ore, associated with the oxidized iron ores, in the old Embreeville iron mines in Washington County. Zinc carbonate ore has been shipped to the extent of a hundred carloads since the discovery of the deposits late in 1912.

North Carolina appeared as a zinc producer for the first time, with an output of 142 tons of zinc. This was obtained by the concentration and separation of zinc-lead sulphide ores from the Silver Hill mine of Davidson County.

CENTRAL STATES.

The upper Mississippi Valley region, embracing adjacent productive areas of Wisconsin, Illinois, and Iowa, had a smaller output of lead concentrates than in 1911, but made a gain in the production of zinc concentrates. The electrostatic zinc separator at Platteville, Wis., destroyed by fire late in 1911, has not been rebuilt, but the magnetic separating plant at Galena, Ill., burned at the same time, has been reconstructed with increased capacity. The concentration of the mining properties of the district into the hands of fewer interests continued during the year.

In the Kentucky-Illinois district the production of both lead and zinc concentrates was more than doubled over that of 1911. Lead is mostly produced in this district as a by-product in the concentration of the fluorspar ores. The large output in 1912 was a result, therefore, of the prosperity of the fluorspar industry, and was especially due to the large new mill at Rosiclaire. The zinc output was chiefly

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of carbonate ore, but there was also a promising output of zinc-blende concentrates.

The Joplin region, embracing southwestern Missouri, southeastern Kansas, and northeastern Oklahoma, made a gain of over 10 per cent in the production of zinc concentrates, the total being 299,421 short tons, as compared to 268,670 tons in 1911. This is the greatest output since 1909, and in point of value is the greatest in the history of the district. The zinc content of the ore was 152,465 tons as against 137,683 tons in 1911. The gain was mostly made by Missouri, and in this gain the sheet-ground output and the soft-ground output showed about equally. The high price of zinc ore which prevailed during the year led to extensive operations in the sheet-ground, and the soft-ground mines in the vicinity of Thoms station and at Galena and Badger were stimulated to energetic operations. Development of the deeper levels at Miami, Okla., was continued and the territory north and east of the productive area was actively prospected.

Northern Arkansas made a slight gain in zinc production, more than half of which was the output of a single mine, the Red Cloud mine in the Rush Creek district. In spite of this fact the great activity in the shallow carbonate and silicate ore diggings in the vicinity of Zinc resulted in a considerable increase in the total number of shippers.

WESTERN STATES.

New Mexico produced about one-third more zinc in 1912 than in the preceding year, the exact figures of the recoverable metal content being 6,783 tons as against 5,119 tons in 1911. This zinc output is derived from the Kelly district in Socorro County, and from Luna, Grant, and Santa Fe counties. In addition to the magnetic separation and wet-concentration mill of the Tri-Bullion Co., the new concentration mill with flotation equipment of the Ozark Smelting & Mining Co. was completed and put in operation in 1913, so that the output for the coming year may show a considerable increase.

Colorado mines produced about 40 per cent more zinc in 1912 than in 1911. This was contained in carbonate ores, practically all from Leadville, and in zinc sulphide ores from Leadville and other districts. The output of carbonate ore at Leadville was 142,782 tons, averaging 29.2 per cent zinc, as compared with 83,905 tons in 1911. The mixed sulphide ores from Leadville and elsewhere were reduced to marketable zinc concentrates in roast magnetic separation plants at Breckenridge, Kokomo, Canon City, Denver, and in Eagle County, and also in the electrostatic separation plant at Silverton. The magnetic concentration plant near the mouth of the Yak tunnel, at Leadville, remained idle during the year.

In Montana the zinc production fell away over 40 per cent from the large production of 1911, the output being 13,459 tons as compared with 21,905 tons in 1911. This was on account of the idleness of the Elm Orlu mine, which was one of the two largest producers in the State in 1911. A zinc concentration plant is now under construction at Timber Butte (South Butte) to treat the ore from this mine. The first 500-ton unit of the new 1,000-ton concentrator of the Butte & Superior Co. was started up in June, 1912, and the second one later in the year. Additions in progress at the close of the year

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to both the mill and the flotation plant will considerably increase the capacity in 1913. Prior to the completion of the new mill the ores from the Butte & Superior mine were treated at the Basin concentrator. Large increases in the zinc output of the Butte district are to be expected.

Idaho made record outputs of zinc ore and concentrates in 1912 when the production of zinc was 6,953 tons as compared to 4,170 tons in 1911. This increase of two-thirds was due mainly to larger shipments of concentrates from the Success and Morning mines, the product at the latter being of the Macquisten flotation plant, the capacity of which was doubled during the course of the year. Other flotation plants are in course of erection to treat zinc middlings in the Cœur d'Alene district.

The zinc production of Utah was 8,534 tons in 1912, against 8,920 tons in 1911. The Park City mining region alone produced 4,001 tons of zinc in 1912, about 47 per cent of the total zinc production of Utah. The Tintic district was also an important zinc producer, for the first time in the history of the district, and yielded 22 per cent of the zinc, or 1,855 tons, in 1912. The Bingham district was a large producer, but its output decreased from 2,358 tons in 1911 to 1,356 tons in 1912. Beaver, Tooele, and Juab counties also yielded some zinc.

The production of zinc in Arizona nearly doubled that of 1911, being 4,379 tons, as compared with 2,281 tons in 1911, and was derived mostly from Mohave County. The larger part came from the Golconda mine, which in September, 1912, was shipping at the rate of 1,200 tons of ore and concentrates a month. The ore from the other producing mine was concentrated in the electrostatic separator at Needles, Cal.

The zinc production of Nevada was four times as large as in the preceding year, being 6,661 tons, as compared with 1,774 tons in 1911. The Yellow Pine mine was the largest producer, shipping more than 1,000 tons of concentrates a month. The Potosi mine also had a large output.

California made a good increase in the production of zinc, the output being about 50 per cent greater than that of the previous year. There are but two producers, the Cerro Gordo mine, in Inyo County, and the Uncompahgre, in San Bernardino County. The Cerro Gordo mine, formerly operated as a lead mine, shipped zinc carbonate ore at the rate of 500 tons monthly during the greater part of the year.

MEXICO.

Zinc deposits are found in the Mexican States of Tamaulipas, Nuevo Leon, San Luis Potosi, Coahuila, and Chihuahua, but most of the ore imported into the United States has come from the two last mentioned.

Statistics of imports of zinc ore from Mexico based upon "consular invoice" or "declaration" are available as far back as 1904, as given on a later page. According to these returns the imports from Mexico were slightly less than in the preceding year, being 35,925 short tons, containing 14,206 tons of zinc, in 1912, as compared with 36,847 tons, containing 14,986 tons of zinc, in 1911. The quantities are smaller than in any year since 1905, due doubtless to the civil conflict in Mexico.

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Certain changes in the Mexican railway tariffs, possibly designed in retaliation for the United States import duty, became effective at the beginning of 1910. The new schedule increased the rate from the zinc districts of northern Mexico to the United States $1.08 per ton and lowered that to Gulf ports $0.27 per ton. The difference in freight rates added to the United States import duty led to the consignment of several experimental lots of zinc ore to European smelters in the early part of 1910, but as yet there have been no shipments on a large scale.

CANADA.

The imports of zinc ore from Canada increased from 2,539 short tons in 1911 to 8,015 tons in 1912, owing no doubt to the high price of spelter in the United States during the year and to the reestablishment of concentration mills and railway facilities which had been destroyed by forest fires in 1911.

The zinc ore produced in British Columbia now finds its way to the zinc smelters of the United States. In the past the output of these ores has not assumed great importance, but there is no doubt of their extended occurrence, and should commercial success attend the efforts at reduction the district would become an important zinc producer.

A strong endeavor is being made in the Dominion of Canada to develop a commercially successful method of reducing the complex zinc ores of the Kootenay district of British Columbia. The Dominion Government appropriated $50,000 for experimental work, a preliminary report upon which is summarized in a later section on metallurgy. The preliminary part of the work having been completed in the laboratories of McGill University at Montreal by Dr. Alfred Stansfield, experiments on a larger scale are now proceeding at the electrothermic zinc smelter at Nelson, British Columbia.

AUSTRALIA.

The principal source of zinc in Australia is the silver-lead mines of Broken Hill, New South Wales. In the early days of Broken Hill mining the crude ore ran about 25 per cent each in lead and zinc and 25 ounces in silver, but by 1904 the average tenor had become reduced to 16 per cent each of lead and zinc with 11 ounces of silver to the ton. At present the average tenor is probably somewhat below those figures. In the effort to get rid of the zinc it was heaped up in enormous piles of zinc tailings and slimes from the concentrating plants, and lead concentrates with 20 per cent of zinc were smelted, lead slags averaging 16 per cent of zinc oxide with a maximum of 20 per cent having been run, according to Donald Clark.[1] Various leaching, electrolytic, and magnetic processes were successively tried and finally discarded for the flotation processes which have been in practical use since 1903. This method of concentration has the advantage that it can be applied to the current output of zinc tailings and slimes as well as to the accumulated stocks of those products.

The importance of flotation in that country is shown in the following table of the production of zinc concentrates at Broken Hill by flotation methods for the period 1907–1912, compiled from the annual

[1] Clark, Donald, Australian mining and metallurgy, Melbourne, 1904, p. 372.

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reports of the department of mines of New South Wales. These concentrates are recovered from zinc middlings and tailings, both from the current product and from the stored accumulations of bygone years of milling operations. The minor quantities of lead concentrates recovered, as a table product from the zinc concentrates, are not included:

Production of zinc concentrates at Broken Hill, New South Wales, 1910–1912, in long tons.

Company.	Flotation process used.	1910		1911		1912	
		Tailings treated.	Concentrates.	Tailings treated.	Concentrates.	Tailings treated.	Concentrates.
Sulphide Corporation	Ballot	.....	80,401	.....	78,822	.....	71,040
Broken Hill Proprietary	Potter	279,150	69,855	422,511	103,378	318,441	88,008
Zinc Corporation	Minerals Separation.	270,637	85,625	321,486	103,630	345,425	86,354
Minerals Separation	Ballot	240,143	79,388	105,297	33,058	.....	.....
Amalgamated Zinc (De Bavay's).	De Bavay.	280,294	82,697	542,015	159,133	538,086	147,013
British Broken Hill	Elmore	33,428	9,622	.....	24,679	.....	27,298
Broken Hill Block 10	...do	3,300	965	.....	.....	.....	.....
Total concentrates produced.	.....	.....	397,866	.....	502,700	.....	418,713
Average zinc content, per cent.	.....	.....	47.2	.....	46.0	.....	47.2

In 1903 the department of mines of New South Wales estimated the tonnage of stored zinc tailings and other zincky residues at 5,687,400 long tons, containing an average of 18.6 per cent of zinc. In 1908 the stocks of zinc tailings were estimated by different authorities to amount to about 7,000,000 tons and to contain about 1,200,000 long tons of zinc, 350,000 tons of lead, and 40,000,000 ounces of silver. A correspondent of the Australian Mining Standard of April 6, 1910, puts the stock of tailings at 6,000,000 tons, the total capacity of the flotation plants when present plans are completed at about 31,000 tons weekly, and the current production of zinc tailings at 24,000 tons weekly. At this rate of excess of consumption over current production it would require about 16 years for the re-treatment plants to absorb the accumulated tailings. This estimate is contingent upon the continuation in the future of the present rate of production of the mines.

The subjoined table compiled from the annual reports of the department of mines of New South Wales shows the quantity and zinc content of zinc concentrates exported from New South Wales from 1904 to 1912:

Exports of zinc (spelter and concentrates) from New South Wales, 1904–1912, in short tons.

Year.	Concentrates.	Zinc content.	Year.	Concentrates.	Zinc content.
1904	64,514	24,996	1909	418,775	161,300
1905	115,956	34,313	1910	524,862	207,085
1906	114,984	37,438	1911	576,343	213,321
1907	264,601	85,842	1912	582,980	217,320
1908	309,044	127,515			

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The following extract from a recent authoritative volume[1] describing the flotation concentration of ores in Australia is interesting in this connection:

There still remains untreated sufficient material to keep the present plants going until 1919, when the accumulated tailing should be exhausted. It is evident that the 1904 estimates of tonnage available were far short of the truth. It is not probable that there will be any further great increase in the annual production of zinc concentrate at Broken Hill. It seems more probable that the pinnacle of tonnage was reached in 1910, and that the production will decrease from now on until the accumulated tailing is finished. There should be no large drop in the total tonnage produced, because the Zinc Corporation, the Amalgamated Zinc, and the Broken Hill Proprietary have reserves of tailing that will last for several years to come. One large plant last year ceased operating, but its place was taken by two smaller ones. A steady, slow decrease in production may be expected, because most of these companies during their early struggles with the vagaries of the processes used their best material to make ends meet. They will probably make as much money out of their lower-grade material as they did out of the higher-grade material. When these immense piles are exhausted, which can be definitely predicted for 1919 or before, there will be a sudden drop in the zinc production of Broken Hill which should considerably disturb the world's zinc market. The present production of Broken Hill represents just about 20 per cent of the total world's production. It is a remarkable fact that this enormous increase in the production of a district which seven years ago produced practically no zinc has caused very little disturbance of the price. This was due to the fact that the high-grade Broken Hill zinc concentrate took the place of low-grade ores from many places in the world outside of the United States, and these latter low-grade mines simply ceased production because the low-grade material could not compete with the high-grade at the same metal price.

The material treated by these processes at Broken Hill is of comparatively high grade, averaging at present close to 18 per cent zinc, 6 per cent lead, and 7.5 ounces silver per long ton. In spite of these good assays the profits are not fabulous. After charging working cost, royalty to process owners, smelters' charges, and management, there is left, on an average, close to 12 shillings per ton treated. In the case of some of the companies this is further decreased by the prices paid to the mining companies for the tailing. The average price for all the tailing and slime sold by the mining companies to the treatment companies averages about 6 shillings per ton, leaving, on an average, not over 6 shillings per ton profit to the treatment companies when zinc is £23 per ton [5 cents per pound]. These are not the actual results of any one company, but are a fair average of the whole. Some of the companies increase this profit in favorable cases by anything up to 4 shillings per ton by the re-treatment of the flotation concentrate, by means of which re-treatment a good lead concentrate is taken out of the flotation concentrate. This lead concentrate represents about 50 per cent of the lead in the flotation concentrate. These figures mean that if the price of zinc dropped to £20 per ton the flotation plants would have to close down or else reduce the working cost or economize in some other quarter.

METALLURGY.

CONCENTRATION.

PROGRESS OF FLOTATION CONCENTRATION IN THE UNITED STATES.

A brief description of various ore flotation processes was given in Part I of Mineral Resources for 1908 (pp. 251–256), and to that summary the reader is referred for further information. Since that time, however, various improvements have been made in the different

[1] Hoover, Theodore J., Concentrating ores by flotation: Min. Mag., London, pp. 161–162, 1912.

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processes, and new processes have been invented. Most of these, together with the Froment, Potter, Delprat, Cattermole, and Sulman, Picard & Ballot, and other processes have been acquired by the Minerals Separation Co. (Ltd.), and that company has recently been merged with the De Bavay Sulphide Process Co., thereby acquiring the rights to the patents of the latter company outside of Australia. The American rights of the Minerals Separation Co. are handled by the Minerals Separation Co. of America.

The complex nature of the zinc ores of the Butte district has made their successful concentration very difficult. The Butte & Superior Co., after adequate tests, installed the Hyde flotation process in the new concentrating plant erected at the mine during 1912. The essentials of the process as given herewith are furnished by the patent specifications (U. S. patent No. 922085):

> The pulp is mixed with acid before thickening in a tank. It has been found that adding the acid in advance cuts down the amount required and promotes the settlement of colloidal material, which may be further aided, if necessary, by adding copperas, alum, or some other coagulant. From the thickener the pulp is pumped to the first-treatment tank, where oil is added and the entire mass agitated. A float concentrate is then taken off, and the gangue goes to the second-treatment tank, where the process is repeated, and thence to the third-treatment tank, where the pulp is agitated and a third concentrate taken off. From this tank the gangue is discharged as a final tailing.
>
> There is considerable silica mixed with the first concentrates, so they are all recleaned in a second device, the concentrates from which are the final product, while the tailing is all sent back through the system again.

The results of operation of the process are given in the Engineering and Mining Journal,[1] from which are abstracted the following notes regarding the concentration plant. The plant consists of two units, each of 500 tons' capacity and each equipped with crushing plant, jigs, hydraulic classifiers, a slime plant for oil flotation, and Wilfley tables, which are used only to separate the lead from the zinc. The ore is first reduced by rolls to six mesh, and after jigging the tailings are reground to 40 mesh and the tailings from the fine jigs ground to 100 mesh and treated by oil flotation. The pulp is thickened to three parts water and one part ore and is mixed with a small quantity of oil and sulphuric acid and agitated.

The Minerals Separation Co. filed suit for infringement of patents controlled by that company against James H. Hyde and the Butte & Superior Co. On July 29, 1913, a decision was handed down in favor of the plaintiff. It is understood the case will be appealed to a higher court.

It is reported that contracts have been made for the installation of the Minerals Separation Co.'s process at the new Elm Orlu mill now under construction at Timber Butte (South Butte), Mont. This process is also being installed in one unit of the large Inspiration Consolidated mill in Arizona and in the mill of the Tennessee Copper Co., at Ducktown, Tenn.

The Macquisten flotation plant installed in 1910 at the Morning mill of the Federal Mining & Smelting Co., at Mullan, Idaho, to treat zinc-barite-siderite middlings from the tables and vanners has been doubled in capacity. Originally consisting of 120 Macquisten

[1] Eng. and Min. Jour., vol. 93, June 1, 1912, p. 1068.

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tubes, a second unit, to utilize 128 tubes, was begun near the close of the year, and this when completed will more than double the capacity of the plant and enable it to handle 200 tons of feed per day.

A concentration plant of 40 tons' capacity was constructed near Park City, Utah, to re-treat tailings from that district to recover their lead and zinc content. Wilfley tables and Macquisten flotation tubes were installed.

The successful operation of the Macquisten process at the Morning mill led to experimental installations of other flotation processes in the Cœur d'Alene district, and as a result flotation plants using a hot acid process, said to be a modification of the Delprat process, are being installed at the Green Hill and at the Hercules mills. Similar processes are being tried out at other mines in the district where the presence of zinc has long been a difficulty. At present a sort of contest is on between the tube and the tank flotation processes, the former costing more to install, the latter being less permanent.

WET CONCENTRATION.

The American Zinc Co. of Tennessee constructed a 1,000-ton mill, which started up in June, 1913, at Mascot, Tenn. As this is one of the largest and most modern zinc mills, a brief description of it will be given. The headframe, power house, crusher house, jig room, and table house are all separate, except that the crusher house and jig room adjoin. The buildings have concrete foundations, steel superstructure, and are covered with galvanized iron. The machinery is electrically group driven. The electrical machinery consists of two 1,200-kilowatt generators, one 200-kilowatt generator, and 10 motors ranging from 20 to 150 horsepower. From the headframe the ore is delivered to a gyratory crusher, which reduces it to 4 inches, thence by belt conveyor to the crusher house and jig room, both equipped with machinery of the straight Joplin type, with the exception of a single bull jig. Either side of the crusher house and the jig room may be operated independently of the other. The fines from the jig room go to the two-story table house, each floor of which is equipped with two Skinner classifiers, three Wilfley tables, six James slime tables, dewaterers, settling cones, and slime tanks. The tailings from the jigs consist of finely crushed dolomitic limestone, and these are sold for road metal and railway ballast. The dolomitic slimes from the tables have a growing market for fertilizer for alfalfa fields.

SMELTING.

ELECTROTHERMIC ZINC SMELTING.

The experimental work authorized by the Government of the Dominion of Canada in the hope of finding a reduction process for the complex zinc sulphide ores of British Columbia has proceeded

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at McGill University, Montreal, under the direction of Dr. Alfred Stansfield. A preliminary report by W. R. Ingalls, the consulting engineer, may be abstracted as follows:[1]

A large number of experiments have been made with several forms of furnaces, certain of which have been of rather elaborate construction, and with a variety of raw material.

Our early experiments were directed chiefly toward a discovery of the metallurgical conditions that have heretofore prevented a satisfactory condensation of zinc as molten spelter. While I can not say that these experiments have afforded us a complete explanation of these conditions, they have taught us a good deal, but in spite of the knowledge acquired we have been so far unable to master the difficulties.

We have, indeed, produced some small quantities of spelter, and in certain experiments have condensed a fairly large proportion as molten metal, but we have not yet been able to do that at will.

Our experiments have thrown light upon the principles of furnace design and have led us to condemn several types that we have tried. Our work has indicated that in order to achieve any material improvement over the ordinary practice of zinc smelting it is necessary to abandon certain features of the latter and contemplate continuous charging of the ore and reduction material and discharging the residuum without interfering with the process of distillation. These conditions introduce a multitude of perplexing difficulties that can be worked out only by tedious experimentation.

The preliminary laboratory experiments have been completed and experiments on a commercial scale are now under way at Nelson, British Columbia, using the experimental electrothermic smelter, formerly operated by the Canada Zinc Co.

In a paper read before the Canadian Mining Institute, March 8, 1912, Mr. Ingalls advances the rather pessimistic conclusion that electrothermic zinc smelting has no future, except under special conditions of extraordinarily cheap power, etc., until the crucial point has been accomplished of reducing and distilling the zinc and condensing commercial proportions of the latter as spelter.

On the other hand, Dr. Joseph W. Richards,[2] in a description of the Johnson electric zinc furnace, says that in usual retort practice 20 to 30 per cent of the zinc distilled is caught as zinc dust and must be recharged, and that Johnson obtained better results than these in the condenser attached to his 25-kilowatt experimental electric furnace. However, Ingalls[3] says that in good retort practice the proportion of zinc dust formed varies from 5 to 10 per cent of the total zinc distilled over.

ZINC SMELTERS.

The following table gives the zinc-smelting capacity of the United States as determined by a recent canvass. Those plants which have an "A" in the column headed "Acid plant" operate sulphuric-acid plants, either at the smelter or elsewhere as indicated in the footnotes.

[1] Canadian Min. Jour., Oct. 15, 1911, pp. 668–669.
[2] Trans. Am. Electrochem. Soc., vol. 19, 1911, pp. 311–316.
[3] Ingalls, W. R., Metallurgy of zinc and cadmium, New York, 1906, p. 205.

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List of active zinc smelters in the United States, showing capacity in 1912, by companies and States.

Company and State.	Location.	Acid plant.	Retorts at close of 1912.	Additional retorts contemplated in 1913.
COLORADO.				
United States Zinc Co.	Pueblo		1,920	
ILLINOIS.				
American Zinc Co. of Illinois	Hillsboro	A	1,600	2,400
Collinsville Zinc Smelting Co.	Collinsville		1,536	
Granby Mining & Smelting Co.	East St. Louis			2,880
Hegeler Bros.	Danville	A	1,800	1,800
Illinois Zinc Co.	Peru	A	4,640	
Matthiessen & Hegeler Zinc Co.	La Salle	A	5,256	576
Mineral Point Zinc Co.	Depue	A	4,520	4,560
National Zinc Co.	Springfield	A[a]	3,200	
Robert Lanyon Zinc & Acid Co.	Hillsboro	A	1,600	
Sandoval Zinc Co.	Sandoval		996	
Total			26,148	12,336
KANSAS.				
American Zinc, Lead & Smelting Co.	Caney		3,648	
Do.	Dearing		3,840	
Chanute Zinc Co.	Chanute		1,280	
Edgar Zinc Co.	Cherryvale		4,800	
Granby Mining & Smelting Co.	Neodesha		3,840	
Kansas Zinc Co.	Altoona		3,360	
Do.	Gas		[b]2,520	
Do.	La Harpe		640	576
Pittsburg Zinc Co.	Pittsburg		910	
Prime Western Spelter Co.	Gas		4,834	
Total			29,612	576
MISSOURI.				
Edgar Zinc Co.	St. Louis		2,000	
Nevada Zinc Co.	Nevada		672	
Total			2,672	
OKLAHOMA.				
Bartlesville Zinc Co.	Bartlesville		5,184	
Do.	Collinsville		8,064	
Lanyon-Starr Smelting Co.	Bartlesville		3,456	
National Zinc Co.	do		4,480	
Tulsa Fuel & Manufacturing Co.	Collinsville		6,232	
Total			27,416	
PENNSYLVANIA.				
New Jersey Zinc Co. (of Pennsylvania)	Palmerton		5,772	
WEST VIRGINIA.				
Clarksburg Zinc Co.	Clarksburg		2,736	
Grasselli Chemical Co.	do	A[c]	5,760	
Do.	Meadowbrook	A[c]	6,912	
Total			15,408	
Total for all States			107,948	13,092

[a] The National Zinc Co. has zinc-roasting furnaces at Argentine, Kans., where the sulphur gases are utilized in an acid plant, the roasted concentrates being shipped to the smelter at Springfield, Ill.

[b] Idle in 1912.

[c] The Grasselli Chemical Co. operates acid plants in connection with its zinc-roasting furnaces at Grasselli, Ind., Cleveland, Ohio, and Newcastle, Pa., the roasted zinc concentrates being shipped to the smelters at Clarksburg and Meadowbrook, W. Va.

From the 107,948 retorts listed above as in existence at the close of 1912 there should be subtracted 8,548 retorts at plants either idle during the year, or just completed at the close of the year, or en-

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gaged in smelting secondary material, leaving 99,400 retorts as active during the latter part of the year. At an average of 4½ tons of spelter per annum for each retort, working upon 60 per cent concentrates, this would give 395,728 tons as the active smelting capacity at the close of the year. On considering the quantity of low-grade ore smelted and the output for the year, 338,806 tons, it may be seen that the smelting capacity must have been crowded during the latter part of the year.

SMELTER CHANGES.

The Robert Lanyon Zinc & Acid Co. completed a smelter at Hillsboro, Ill., late in the year, which started up in 1913. It is equipped with 1,600 retorts and a plant for converting the roaster fumes into sulphuric acid. The company controls sufficient coal land to insure an adequate fuel supply.

The American Zinc Co. of Illinois, a subsidiary company of the American Zinc, Lead & Smelting Co., is building a new smelter and acid plant, also at Hillsboro, Ill. The first unit of 1,600 retorts started up late in 1912 and an additional 2,400 retorts will be added in 1913.

Hegeler Bros. are building, to be finished in 1913, an addition of 1,800 retorts, which will exactly double the capacity of their smelter at Danville, Ill. The acid plant will be correspondingly enlarged.

The Matthiesson & Hegeler Zinc Co. is building an addition of one block of 876 retorts with additional acid capacity also.

The Granby Mining & Smelting Co. is constructing a smelter, with 2,880 retorts and an acid plant, at East St. Louis, Ill. It is expected to be ready for operation late in 1913.

The Mineral Point Zinc Co. is building an addition to its smelter at Depue, Ill., which will more than double the capacity. The addition in 1913 of 4,560 retorts to the 4,520 retorts already in operation will give a total of 9,080 retorts in one plant, the largest zinc smelter in the United States. The completion of this addition and of the additions under construction at other plants, together with the new plant at Hillsboro and the new Granby plant at East St. Louis, will give Illinois a total of $37,666 retorts, as against 30,188 retorts now active in Kansas.

It is authoritatively announced that the American Metal Co. (Ltd.) has formed a subsidiary company known as the American Zinc & Chemical Co., to build a large modern zinc smelter and acid plant at Langeloth, a town to be built near Burgettstown, Pa., about 25 miles west of Pittsburgh. An extensive tract underlain with the Pittsburgh coal seam has been purchased. The contract for structural steel is reported to have been let.

TRADE CONDITIONS.

WORLD'S PRODUCTION.

The world's production of spelter in 1912 was again the largest in history, exceeding that of the record output of 1911 by 83,984 tons, or 8.5 per cent. The greatest increase was contributed by the United States, which exceeded its production of 1911 by 52,280 tons, or 18.2 per cent. Germany made a gain of 22,786 tons, or 8.3 per cent.

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THE MINERAL INDUSTRY

ITS

STATISTICS, TECHNOLOGY AND TRADE

DURING

1913

FOUNDED BY RICHARD P. ROTHWELL

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ZINC

By R. L. Bartlett

The total production of primary spelter by ore-smelters in 1913 was 346,676 short tons. There was also produced about 50,000 tons of secondary spelter, this being produced from such sources as drosses, skimmings, and old metals. This latter figure is given in round numbers, as owing to the difficulty of securing complete data, the exact amount cannot be ascertained.

As usual, Missouri had the largest output, even though the output showed a decrease of 20,000 tons from 1912. Colorado was next with a slight increase over the preceding year, and Montana was third, with a gain in spelter production of over 150 per cent. Good gains were also made by New Jersey and Oklahoma.

While the total production of spelter shows a gain over 1912, the profits to the zinc industry were much less, owing to the much lower prices prevailing during the year. The year 1913 opened with a falling market, and the decline in price continued until June, at which time there was a slight rally, but it was short lived, for with the passage of the tariff bill, another decline set in.

The reason for the increase in spelter production in 1913 over 1912, is that the high prices prevailing in the former year stimulated zinc mining, and owing to what may be termed the "inertia" of mining, heavy production continued for a considerable time after the decline from the high prices which had furnished the stimulus.

It is probable that a much larger stock of concentrates was held by the mining companies at the end of 1913 than at the end of 1912, and for this reason the actual increase in production should probably be more than is estimated.

Calamine ores were in strong demand by smelters, owing to the increasing cost of natural gas, and as low as 18 per cent. ores were accepted.

In spite of the low prices, Montana more than doubled its production, and in view of this increasing competition from the West, which seems able to produce profitably at prices at which many older eastern districts cannot meet their payroll, the outlook for the latter is somewhat gloomy. Another disquieting feature is that the present tariff has made possible importations of cheaper ore, so soon as Mexico shall have settled to a point where mining can be resumed with safety.

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EXPORTS OF ZINC ORE AND ZINC OXIDE FROM THE UNITED STATES. (a)

Year.	Ore.			Oxide.		
	Short tons.	Value.	Value per ton.	Short tons.	Value.	Value per ton.
1899....	28,221	[illegible]	$25.90	5,343	$366,598	$68.61
1900....	42,062	[illegible]	26.98	5,656	496,380	87.76
1901....	44,146	[illegible]	26.45	4,561	393,259	86.22
1902....	55,733	[illegible]	26.00	5,358	433,722	80.93
1903....	39,411	[illegible]	25.04	7,215	578,215	80.14
1904....	35,911	[illegible]	25.22	8,157	628,494	77.05
1905....	30,946	[illegible]	27.41	11,290	810,203	71.83
1906....	27,720	[illegible]	26.46	15,578	1,149,297	73.78
1907....	20,352	[illegible]	28.47	13,256	1,069,924	80.71
1908....	26,108	[illegible]	33.60	12,008	845,070	70.37
1909....	12,456	[illegible]	33.10	14,846	1,026,377	69.14
1910....	19,711	[illegible]	32.95	13,166	943,968	71.69
1911....	18,281	[illegible]	44.12	14,618	1,051,311	71.92
1912....	23,349	[illegible]	35.30	17,064	1,247,702	73.12
1913....	17,712	[illegible]	35.58	14,466	1,136,257	78.55

(a) In addition to the exports of ore, 15,887 short tons of zinc dross (galvanizers' waste) were exported in 1906, 9593 short tons in 1907, 8405 short tons in 1908, 7069 short tons in 1909, 4728 short tons in 1910, 4246 tons in 1911, 205 tons in 1912, and 28 tons in 1913.

EXPORTS OF DOMESTIC SPELTER FROM THE UNITED STATES. (a)

Year.	Plates, Sheets, Pigs and Bars.		Wares.	Total Value.
	Short Tons.	Value.	Value.	
1898.....	10,499	$1,033,959	$138,165	$1,724,188
1899.....	6,755	742,521	143,232	1,978,295
1900.....	22,411	2,217,963	99,288	2,317,251
1901.....	3,390	228,906	82,046	310,952
1902.....	3,237	300,557	114,197	414,754
1903.....	1,521	163,379	71,354	234,733
1904.....	10,073	1,094,490	117,957	1,212,447
1905.....	5,516	682,254	159,995	842,249
1906.....	4,670	583,526	204,269	787,795
1907.....	563	75,526	186,283	261,397
1908.....	2,640	250,254	88,485	338,739
1909.....	2,566	263,010	69,751	332,761
1910.....	3,990	426,560	101,336	527,896
1911.....	6,872	810,099	134,518	944,617
1912.....	6,634	864,292	140,027	1,004,319
1913.....	7,782	955,667	145,984	1,101,651

(a) There is also a comparatively insignificant re-export of foreign-made spelter and zinc wares.

IMPORTS OF ZINC AND ZINC OXIDE INTO THE UNITED STATES.
(In pounds.)

Year.	Sheets, Blocks, Pigs and Old.		Manufactures.	Total Value.	Oxide.	
	Amount.	Value.			Dry.	In Oil.
1898..	2,742,357	$109,624	$13,448	$123,072	[illegible]	27,050
1899..	2,985,463	151,956	14,800	166,756	[illegible]	41,599
1900..	2,013,196	97,772	36,836	134,608	[illegible]	38,706
1901..	775,881	30,920	42,643	73,563	[illegible]	128,198
1902..	1,238,091	46,713	37,191	83,904	[illegible]	163,081
1903..	728,614	30,900	18,938	49,838	[illegible]	166,034
1904..	933,474	44,326	11,918	56,244	[illegible]	224,244
1905..	1,042,081	51,052	12,390	63,442	[illegible]	342,944
1906..	4,407,481	253,310	17,385	270,695	[illegible]	292,538
1907..	3,555,860	210,322	16,282	226,604	[illegible]	362,418
1908..	1,762,627	85,885	7,474	93,359	[illegible]	210,166
1909..	19,340,029	826,588	19,176	845,764	[illegible]	535,024
1910..	6,904,389	289,689	27,475	317,164	[illegible]	836,257
1911..	3,275,340	170,534	124,983	295,517	(a) [illegible]	.....
1912..	22,229,881	1,280,426	293,089	1,573,515	(a) [illegible]	.....
1913..	12,199,267	660,706	62,256	(b) 722,962	[illegible]	284,150

(a) Both dry and in oil.
(b) Zinc dust to the amount of 4,382,470 lb., valued at $227,585, was also imported in 1913.

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Spelter Statistics for 1913[1]

W. R. Ingalls.—Revised and complete statistics of the zinc industry in the United States show a total production of spelter by ore-smelters in 1913 of 358,262 tons, of which about 8764 tons were derived from galvanizers' dross, skimmings, scrap, etc., and the remainder from ore. The production from dross, scrap, etc., was 7447 tons in 1912, 9030 tons in 1911 and 7793 tons in 1910. These data do not include the production of spelter by concerns which treat dross and scrap only, whose output amounts to about 16,000 tons per annum.

PRODUCTION OF SPELTER IN THE UNITED STATES.
BY ORE SMELTERS.

States.	1905.	1906.	1907.	1908.	1909.	1910.(c)	1911.(c)	1912. (c)	1913.(c)
Colorado	6,599	6,260	5,200	3,079	6,115	6,564	7,477	8,860	8,637
Illinois (a)	45,357	48,238	56,103	50,244	75,229	79,570	88,681	94,902	111,451
Kansas	114,948	129,741	133,561	99,136	103,390	105,697	106,173	111,761	85,157
Missouri	11,800	11,068	11,594	10,196	8,418	6,485			
Oklahoma	.....	.....	5,094	14,867	28,840	34,760	46,333	76,837	83,230
South and East (b)	23,044	30,167	38,060	32,989	44,470	43,989	47,172	56,278	69,687
Total tons of 2000lb.	201,748	225,494	249,612	210,511	266,462	277,065	295,836	348,638	358,262
Total tons of 2240lb.	180,132	201,343	222,868	187,776	237,913	247,364	264,139	311,284	319,875
Total metric tons	183,014	204,548	226,398	190,933	241,730	251,348	268,378	316,268	325,102

(a) Up to 1903, inclusive, includes also the production of Indiana. (b) New Jersey, Pennsylvania and Virginia, and (since 1903) West Virginia. (c) From *Eng. and Min. Journ.*

BY DROSS AND SCRAP SMELTERS

	1910	1911	1912	1913
	11,350	(a) 13,500	(a) 15,000	(a) 16,000
Total Production of Zinc				
	1910	1911	1912	1913
Ore smelters	277,065	295,836	348,638	358,262
Dross smelters (a)	11,350	13,500	15,000	16,000
Totals	288,415	309,336	363,638	374,262

(a) Estimated.

The amount of the recovered spelter that should properly be counted statistically is uncertain. A good deal of scrap zinc is remelted in the manufacturing plants where it is made, *e.g.*, in every rolling mill, and such remelted zinc should not, of course, appear in any statistical

[1] *Eng. Min. Jour.*

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enumeration. On the other hand certain smelters buy and re-distill and subsequently sell as spelter, often of excellent quality, what was distinctly a waste product. This is obviously an addition to the new supply of spelter and should be recognized just as is that which the ore smelters recover from dross, skimmings, etc.

RECEIPTS OF ZINC ORE.

(In tons of 2000 lb. This table includes the receipts of ore by the smelters only and does not include the production of ore exported or what was taken by the manufacturers of zinc oxide.)

State	1910 (a)	1911 (a)	1912 (a)	1913
Arizona	7,568	6,895	11,937	9,247
Arkansas	190	860	1,567	1,500
California	(d)	3,754	6,639	6,796
Colorado	77,065	158,528	212,423	220,166
Idaho	10,248	9,667	19,482	31,835
Kentucky	179	575	947	441
Missouri-Kansas	289,913	268,500	289,177	280,000
Montana	33,514	56,593	34,034	91,257
Nevada	4,915	5,666	20,654	22,313
New Mexico	15,959	10,184	25,889	14,593
Oklahoma	1,640	8,750	4,325	23,500
Tennessee	2,775	3,439	6,635	8,297
Utah	27,318	19,933	24,539	27,073
Wisconsin (b)	51,383	71,565	90,762	89,662
Others	46,905	44,896	56,099	57,241
Totals	563,572	669,805	805,109	884,021
Mexico	29,198	28,596	29,436	19,965
Canada	11,795	2,356	9,707	6,012
Grand totals (c)	610,565	700,257	844,252	909,998

(a) Smelters' receipts: reports missing from three small smelters. (b) Including Illinois and Iowa. (c) In addition to the ore reported from Canada and Mexico, zinc smelters received a few thousand tons from Europe and Eastern Siberia in 1913. (d) Included in "Others."

Of the total spelter production of the ore smelters in 1911, concerns using coal as fuel produced 119,989 tons, or about 40 per cent. of the total. In 1912 they produced 134,077 tons, which was only about 38 per cent. of the total. In 1913, their production as 231,346, or about 60 per cent. of the total.

In addition to the spelter production there was an output of 423 tons of commercial zinc dust in 1913, against 492 tons in 1912 and 254 tons in 1911. Two smelters are engaged in this business. The importations of zinc dust were about 2200 tons, against 2400 tons in 1912 and 1713 tons in 1911.

In 1910 there were produced 3398 tons of spelter in bond. In 1911 the production in this way was 9598 tons, in 1912 it was 10,879 tons, and in 1913, it was 5904 tons. The exports of bonded spelter are stated in an accompanying table.

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SPELTER PRODUCTION IN 1913 BY QUARTERS.

(Reports of Ore Smelters Only.)

(In tons of 2000 lb.)

District.	I.	II.	III.	IV.
Illinois	27,924	28,523	26,118	28,986
Kansas-Missouri	22,006	23,320	19,204	20,127
Oklahoma	21,430	21,840	18,502	21,458
Others (a)	20,723	20,153	19,238	18,211
Totals	92,083	94,336	83,062	88,782

(a) With the exception of one plant in Colorado these are all Eastern works.

There was a large increase in zinc-ore production in 1913, which in part was due, no doubt, to the stimulus of the high prices prevailing in the early part of the year, but even allowing for that, the increase was so large that it must cause a reconsideration of previously held ideas respecting a shortage of zinc ore. There was a large increase in the output of Butte, Mont., where milling difficulties were solved. Idaho and Oklahoma exhibited noteworthy gains. In Tennessee, where an important new mine was developed, there was only a small gain. Rather surprising was the falling off in New Mexico, where the successful milling of the Magdalena ore was supposed to have become an accomplished fact. Joplin, Leadville and the Wisconsin districts about held their own.

The statistics of zinc-ore production are based in the main upon reports from various smelters respecting the quantity of ore received by them and its origin. There are some discrepancies between the figures thus compiled and figures reported in other ways. Thus, the production of the Butte & Superior Co. was reported at about 103,000 tons, while the smelters reported receiving only 91,257 tons from Montana. Mr. Kennedy's figures for Wisconsin showed a great falling off in output in that state in 1913, but the smelters' figures show about the same total of ore received in 1913 as in the previous year.

In 1913, there were eight zinc smelters who produced sulphuric acid from blende, the Robert Lanyon Zinc & Acid Co. being an addition to the list. The statistics of the works of this class for the last 3 years are as follows:

STATISTICS OF SPELTER-SULPHURIC ACID WORKS.

(In tons of 2000 lb.)

	1910.	1911.	1912.	1913.
Ore received			237,205	364,741
Spelter produced	100,791	115,310	127,655	148,188
Sulphuric acid produced, basis 60°.	202,000	252,192	262,556	306,167

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As in the previous year the smelters who make sulphuric acid drew their main ore supply from the Joplin district and Wisconsin, but it is noteworthy that some of these smelters now use a good deal of Western ore. In 1911 they received 107,995 tons of blende from the Joplin district and 71,168 tons from Wisconsin. In 1912 they obtained 117,806 tons from Joplin and 87,676 tons from Wisconsin. In 1913 they obtained 159,540 tons from the Joplin district and 84,495 tons from the Wisconsin district. Oklahoma and Kansas are reckoned with the Joplin district.

The total stock of spelter at smelters' works at the end of 1913 was 40,115 tons, against 4264 at the end of 1912, 9323 at the end of 1911 and 23,000 tons at the end of 1910.. The deliveries into consumption are computed in the accompanying table.

DELIVERIES INTO CONSUMPTION.

	1910.	1911.	1912.	1913.
Stock, Jan. 1	11,500	23,000	9,323	4,264
Production	288,415	309,336	363,638	374,262
Imports	3,452	1,637	11,115	6,100
Totals	303,367	333,973	384,076	384,626
Exports, domestic	3,989	6,872	6,634	7,782
Exports, foreign	4,468	11,270	8,700	.....
Stock, Dec. 31	23,000	9,323	4,264	40,115
Deliveries	271,892	316,508	364,488	.....

The stock of spelter at the end of 1913 was the largest of which we have record. Deliveries are computed by difference between (*a*) stocks, plus production, plus imports, and (*b*) exports plus stocks, but the experiences of 1912–13 show how futile it is to attempt to compute consumption in that way, and how important a part is played by the stocks in the yards of galvanizers and brass makers, the invisible supply. At the end of 1912 that invisible supply was large, no doubt; at the end of 1913 it was believed to be small. However, that was only surmise and the subsequent history of the market throws doubt upon it. Included in the stock reported at the end of 1913 was 615 tons of bonded spelter.

Another point that deserves note is the increasing production of spelter from dross and the decreasing exports of that material. In 1911 the exportation was 4246 tons; in 1912 it was 205 tons; and in 1913 it was only 28 tons. We estimate the product redistilled from dross, skimmings, etc. (by works treating this material only) at 13,500 tons in 1911, 15,000 tons in 1912, and 16,000 tons in 1913, and probably these figures are underestimates rather than overestimates. In taking a statistical view, this spelter must be added to the spelter obtained otherwise, it being sold in the same way and being just as good, and indeed often better than some of the virgin spelter.

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The following tables compiled by C. E. Siebenthal and published by the United States Geological Survey, are as authentic as can be obtained, and give the production of primary and secondary spelter in United States, World's production of spelter, consumption of primary spelter in United States, as well as exports and imports of zinc ore.

PRODUCTION OF SPELTER IN 1913.
(In tons of 2000 lb.)

	1912.	1913.	Change in 1913.	
			Quantity.	Percentage.
Production of primary spelter in the United States	338,806	346,676	+ 7,870	2.3
Consumption of primary spelter in the United States	340,341	295,370	− 44,971	13.2
Production of spelter in the world	1,070,045	1,103,359	+ 33,314	3.1

PRODUCTION OF PRIMARY SPELTER[1] IN THE UNITED STATES, 1908–1913.
(In Tons of 2000 lb.)
[1] Apportioned According to Source of Ore.

	1908.	1909.	1910.	1911.	1912.	1913.
UNITED STATES:						
Arizona	152	2,862	2,594	2,336	4,092	3,152
Arkansas	2,002	135	286	385	604	478
California	27			1,099	1,673	2,535
Colorado	24,885	20,121	23,238	42,233	60,841	58,113
Idaho	581	901	3,454	3,180	6,800	10,190
Illinois	298	675	1,551	2,884	3,952	1,345
Iowa	518		40			
Kansas	8,628	9,185	10,220	6,843	5,668	9,956
Kentucky	341	22	29	205	394	172
Maine						
Missouri	123,655	140,676	140,652	127,540	149,557	129,018
Montana	900	4,725	12,408	22,115	14,196	35,756
Nevada	398	825	1,516	1,595	6,132	5,825
New Jersey	6,926	16,035	20,217	15,128	16,941	24,247
New Mexico	134	3,961	4,911	3,778	6,882	3,765
Oklahoma	2,235	3,008	2,297	2,247	3,041	6,397
Tennessee	341	695	925	1,000	1,925	2,535
Texas					245	303
Utah	282	5,960	7,221	7,004	7,756	9,503
Virginia	910	58	1,165	228	62	116
Washington				12		
Wisconsin	17,538	20,381	19,752	31,809	34,137	33,743
Total domestic	190,749	230,225	252,479	271,621	323,907	337,252
FOREIGN:						
Canada	2,425	978	3,304	1,598	4,199	1,424
Mexico	17,250	24,557	13,401	13,307	10,700	6,305
Europe						1,175
Siberia						620
Total foreign	19,675	25,535	16,705	14,905	14,899	9,424
Grand total	210,424	255,760	269,184	286,526	338,806	346,676
Apportioned According to Locality in which Smelted.						
Illinois	50,244	67,653	73,035	83,130	88,397	106,654
Kansas	99,298	103,299	105,697	98,413	101,104	74,106
Oklahoma	14,864	28,782	34,760	46,315	76,925	83,214
Other States	46,018	56,026	55,689	58,668	72,380	82,702
Total	210,424	255,760	269,184	286,526	338,806	346,676

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PRODUCTION OF SECONDARY ZINC IN THE UNITED STATES, 1908–1913.

Secondary spelter, redistilled	7,159	9,273	12,784	14,043	26,064	[1]26,491
Secondary spelter, remelted	9,811	23,767	28,439	26,470	26,187	[1]23,000
Recovered zinc in alloys, excluding old brass remelted	665	1,181	2,709	3,223	3,912	[1]3,600

[1] Primary spelter is made directly from ore, but secondary spelter is recovered from such sources as drosses, skimmings, and old metals.
[2] Subject to final revision.

WORLD'S PRODUCTION OF SPELTER 1908–1913.

	1908.	1909.	1910.	1911.	1912.	[1]1913.
Locality in which smelted:						
Australia	1,198	.....	560	1,904	2,531	4,105
Austria and Italy	14,063	13,931	14,666	18,602	21,609	23,856
Belgium	181,851	184,194	190,233	215,050	220,678	217,941
France and Spain	61,512	61,859	65,191	70,791	79,543	78,293
Germany	239,062	242,594	251,046	276,008	298,794	311,914
Great Britian	60,029	65,422	69,531	73,803	63,085	65,201
Holland	19,017	21,548	23,121	25,059	26,380	26,813
Norway	.....	.....	.....	7,363	8,959	19,040
Poland	9,740	8,758	9,514	10,952	9,659	9,520
United States	210,424	255,760	269,184	286,526	338,806	346,676
Total	796,896	854,066	893,046	986,061	1,070,045	1,103,359
United States percentage of world's production	26.4	29.9	30.1	29.1	31.7	31.4

[1] Subject to final revision.

CONSUMPTION OF PRIMARY SPELTER IN THE UNITED STATES, 1908–1913.

	1908.	1909.	1910.	1911.	1912.	1913.
Supply:						
Stock, Jan. 1—						
In bonded warehouses	2	9	39	31	32	48
At smelters	26,364	19,613	11,167	23,201	9,049	4,474
Production—						
From domestic ore	190,749	230,225	252,479	271,621	323,907	337,252
From foreign ore	19,675	25,535	16,705	14,905	14,899	9,424
Imports	881	9,454	1,960	609	11,115	6,100
Total available	237,671	284,836	282,350	310,367	359,002	357,298
Withdrawn:						
Exports, foreign, from warehouse	8	334	4,758	11,276	6,286	6,027
Exports, foreign, under drawback	1,234	.....	4,486	3,079	1,188	7,459
Exports, domestic	2,640	2,566	3,990	6,872	6,634	7,783
Stock, Dec. 31—						
In bonded warehouses	9	39	31	32	48	.....
At smelters	19,613	11,167	23,201	9,049	4,474	40,659
Total withdrawn	23,504	14,106	36,466	30,308	18,383	61,928
Apparent consumption	214,167	270,730	245,884	280,059	340,372	295,370

NOTE.—Imports and exports of spelter are given under the heading "Consumption." The imports of spelter in 1909–1913 are as given in the December Summary of the Bureau of Foreign and Domestic Commerce except that for 1909–1912 inclusive the quantities given therein have been diminished by the quantity of zinc dust imported since Aug. 6, 1909, for the reason that the imports of spelter and zinc dust were not separated in the Summary. The imports of spelter are also exclusive of sheet zinc. The stock in bonded warehouses does not include zinc ore in bond or the spelter made thereform, such spelter being included in stock at smelters.

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EXPORTS, 1908–1913.

	1908.	1909.	1910.	1911.	1912.	1913.
Zinc ore, domestic	26,108	12,455	19,711	18,281	23,349	17,713
Zinc dross	8,405	7,069	4,729	4,246	205	28

IMPORTS OF ZINC ORE, 1904–1913.

	Canada.		Mexico.		Total.[1]	
	Ore.	Zinc content.	Ore.	Zinc content.	Ore.	Zinc content.
1904	.....	.....	2,264	.....	2,264	.....
1905	4,063	.....	18,074	.....	22,137	.....
1906	423	.....	59,991	.....	55,414	.....
1907	1,112	.....	102,005	.....	103,117	.....
1908	7,406	.....	46,351	.....	53,757	.....
1909	10,024	.....	104,826	.....	114,850	.....
1910	4,749	1,922	67,818	23,517	72,626	25,439
1911	2,359	947	36,847	14,986	39,116	15,933
1912	8,015	3,661	35,925	14,206	43,940	17,567
1913	8,357	3,280	18,018	6,377	31,416	13,497

[1] Includes also 3,232 tons of ore from Europe, containing 2,440 tons of zinc and 1,792 tons from Siberia, containing 1,397 tons of zinc.

NOTE.—In view of the general interest in the importation of zinc ores the above table, showing the entry of such ores from Mexico and Canada for 1904–1913, by calendar years, is given. These general imports of zinc ores differ from "imports for consumption" by the difference in stock in bonded warehouse at the beginning and close of the year and by the quantities withdrawn from warehouse for exportation.

The statistics of general imports, as published by the Bureau of Foreign and Domestic Commerce, are based on "consular invoice" or "declaration," which is a close approximation only to actual weights and values. The true weights and values of all dutiable articles are determined when the duties are paid, and the correction is applied as "addition by liquidation" or "deduction by liquidation." On free articles this correction is not made. Prior to 1909 zinc ore was in large part undutiable, and in that part of 1909 prior to August 6 a portion of the imports on zinc ore was free. The quantities added or deducted by the liquidation changes are known, and if applied to the consular invoice figures should theoretically give the true figures of imports, and this correction has been made in preceding reports. It has been ascertained, however, that for one customs district the returns, under special instructions, are made in such form that the use of the liquidation corrections involves a considerable duplication. For this reason no correction of the consular invoice figures has been attempted in the present statement. The figures are exclusive of 10,431 tons of other ore imported in 1910, which carried 2,645,111 lb. of zinc as an accessory constituent, of 25,769 tons in 1911 carrying 6,283,437 lb. of zinc, and of 18,245 tons in 1912 carrying 4,362,508 lb. of zinc, an average of about 13 per cent., which is not recoverable, and hence, for the purpose of this report, not to be classed with zinc-ore imports. Such ores entered free in 1913 and were not enumerated.

The figures of spelter production in this report do not include the zinc content of zinc pigments produced during the year.

The figures given in the foregoing tables are based on confidential reports by each zinc-smelting company in operation in the United States. The totals of production in foreign countries are taken from the annual statement by Henry R. Merton & Co., of London. The figures of imports and exports are taken from the records of the Bureau of Foreign and Domestic Commerce of the Department of Commerce, recalculated to short tons, and those for 1913, not having been finally checked, are subject to minor revision. This statement is designed to afford at the earliest practicable date authentic figures of the production of spelter in the United States in 1913. The cordial coöperation of each zinc-smelting company is acknowledged with keen appreciation.

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ZINC SMELTING CAPACITY OF THE UNITED STATES.

(Number of Retorts at End of Years.)

Name.	Location.	1912.	1913.
American Zinc, Lead & Smelting Co	Hillsboro, Ill	1,600	3,200
American Zinc, Lead & Smelting Co	Deering, Kan	3,840	3,840
American Zinc, Lead & Smelting Co	Caney, Kan	3,648	3,648
Bartlesville Zinc Co	Bartlesville, Okla	5,184	5,184
Bartlesville Zinc Co	Collinsville, Okla	8,064	8,064
Chanute Zinc Co	Chanute, Kan	1,280	1,280
Clarksburg Zinc Co	Clarksburg, W. Va	.....	2,736
Beer, Sondheimer & Co	Altoona, Kan	3,300	(d) 3,960
L. Vogelstein & Co	Gas City, Kan	(a) 2,560	(e) 2,520
L. Vogelstein & Co	La Harpe, Kan	640	(f) 1,856
Collinsville Zinc Co	Collinsville, Ill	1,536	1,536
Edgar Zinc Co	St. Louis, Mo	2,000	2,000
Edgar Zinc Co	Cherryvale, Kan	4,800	4,800
Granby Mining & Smelting Co	Neodesha, Kan	3,840	3,760
Grasselli Chemical Co	Clarksburg, W. Va	} 12,672	12,672
Grasselli Chemical Co	Meadowbrook, W. Va		
Hegeler Bros	Danville, Ill	1,800	1,800
Illinois Zinc Co	Peru, Ill	4,640	4,640
Lanyon-Starr Smelting Co	Bartlesville, Okla	3,456	3,456
Lanyon Zinc & Acid Co	Hillsboro, Ill	.....	1,840
Matthiessen & Hegeler	Lasalle, Ill	5,256	5,256
Mineral Point Zinc Co	Depue, Ill	4,520	6,800
National Zinc Co	Bartlesville, Okla	4,256	4,480
Nevada Zinc Co	Nevada, Mo	(b) 648	672
New Jersey Zinc Co	Palmerton, Penn	5,772	5,760
Pittsburg Zinc Co	Pittsburg, Kan	910	910
Prime Western Spelter Co	Gas City, Kan	4,834	4,768
Sandoval Zinc Co	Sandoval, Ill	896	996
Tulsa Fuel and Manufacturing Co	Collinsville, Okla	6,232	6,232
United States Zinc Co	Pueblo, Colo	1,920	1,920
United Zinc and Chemical Co	Springfield, Ill	3,200	3,200
Total		103,304	113,786

(a) Inactive. (b) Inactive during latter part of year. (c) (d) Now Altoona Zinc Smelting Co. (e) Kansas Zinc Co. (f) La Harpe Spelter Co.

ADDITIONAL RETORTS BUILDING IN 1914.*

American Zinc Co. of Illinois	800
Granby M. & S. Co.	3,240
Hegeler Bros.	1,800
Matthiessen & Hegeler Zinc Co.	912
Mineral Point Zinc Co.	2,280
American Zinc & Acid Co.	3,456
Total	12,488

The following table taken from the *Mining & Engineering World*, shows the production of spelter from both domestic and foreign ores, apportioned according to the states in which it was smelted, by 6-month periods:

PRODUCTION OF SPELTER FROM DOMESTIC AND FOREIGN ORES.

	1912.		1913.	
State.	First half.	Second half.	First half.	Second half.
Illinois	44,224	44,065	53,524	52,424
Kansas	52,485	48,376	42,645	33,846
Oklahoma	36,010	41,584	43,253	39,755
Other states	33,777	38,109	40,791	39,337
Total	166,496	172,134	180,213	165,362
Yearly total	338,630		345,575	

* From the report upon spelter production in 1913 by C. E. Siebenthal of the U. S. Geological Survey.

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As shown in the above table, the output for all the states was less in the second half of the year, Kansas and Oklahoma having the greatest loss. At the beginning of the year, about 101,000 retorts were available, and 5850 more were added during the year, giving for the plants which were active during the year a total of about 107,000. The following table from *Mining & Engineering World* gives the capacity of the smelters by states, together with additions planned for 1914, and the average number of retorts in active operation during December, 1913.

CAPACITY OF ZINC SMELTERS.

State.	Total retorts end of 1913.	Retorts to be added in 1914.	Average number of retorts operated in December, 1913.
Illinois	29,268	9,032	27,067
Kansas	33,862	.....	15,996
Oklahoma	27,416	.....	23,024
Other states	25,760	3,456	23,596
Total	116,306	12,488	89,683

From the above it is seen that only three-fourths of the total smelting capacity was operated during December. In Kansas one-half of the retorts were idle, and in Oklahoma about one-sixth. Because of unfavorable conditions construction work by plants planning additions has not been rushed. Hegeler Bros. will not start operating their new retorts until the middle of 1914. Of the 4560 retorts to be added in 1913 to the Mineral Point smelter at Depue, Ill., only 2280 were actually constructed and 2280 will be added some time in 1914. No new retorts are planned in Kansas or Oklahoma for 1914. The construction work on the smelter of the American Zinc and Chemical Co., at Langeloth, Pa., is being pushed, and it is hoped to have it operating some time in the summer. It is planned to enlarge this plant as necessitated by the closing down of affiliated plants in Oklahoma, due to failure of natural gas there. The Prime Western Spelter Co. is constructing zinc roasting furnaces and an acid plant at Tiltonville, Ohio.

The Spelter Market in 1913

Spelter opened at St. Louis in January at 7.17 cents a pound, which was the maximum price for the year. From this price the decline was rapid, until by the middle of June the low mark of the year was reached at 4.974 cents. A slight rise brought the price to 5.85 cents by the latter part of August, but this rally was short lived, and at the close of the year spelter at St. Louis was quoted at about 5 cents.

There were many causes contributing to bring about the rapid decline from the high prices prevailing at the beginning of the year. It will readily be admitted that a price above 7 cents is high, for experience and observation have shown that about 5 1/2 cents at St. Louis is the normal

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AMERICAN METAL CO.'S VOTING TRUST CERTIFICATES.

LETTER FROM THE ALIEN PROPERTY CUSTODIAN TRANSMITTING IN RESPONSE TO A SENATE RESOLUTION OF JANUARY 12, 1920, A COMMUNICATION SUBMITTING A REPORT ON CERTAIN SALES AND TRANSFERS OF VOTING TRUST CERTIFICATES OF THE AMERICAN METAL CO. (LTD.).

JANUARY 31, 1920.—Referred to the Committee on the Judiciary and ordered to be printed.

WASHINGTON, D. C., *January 30, 1920.*

I, Francis P. Garvan, Alien Property Custodian, in answer to Senate resolution dated January 12, 1920, make the following report:

The resolution calling for this report as the same appears in the Congressional Record of January 12, 1920, page 1435, reads as follows:

Whereas according to press reports, the Alien Property Custodian has recently sold 34,644 voting trust certificates of the American Metal Co. to a syndicate, the members of which apparently include persons connected with the former German owners of this company, and persons whose ownership of stock in such metal companies was declared by the Alien Property Custodian in his report published in February, 1919 (S. Doc. 435, 65th Cong., 3d sess.), to be a menace to the country: Therefore be it

Resolved, That the Alien Property Custodian is hereby directed to report to the Senate as soon as practicable:

First. The names of the purchasers of such certificates: the number of certificates purchased by each; and the relations, if any, of each purchaser to the former German owners of such American Metal Co.

Second. The reasons for and the circumstances surrounding the sale of a large portion of such voting trust certificates to L. Vogelstein, in view of the reference to such Vogelstein on pages 92 and 93 of the report of the Alien Property Custodian herein mentioned.

Third. The provisions of law, if any, authorizing, and the reasons for, the formation of a voting trust and the sale of voting certificates, in lieu of the sale of the shares of stock taken from the alien enemy holders thereof.

Fourth. All other pertinent facts in connection with the sale and transfer of such voting trust certificates, and the issuance and award of such certificates by the advisory committee.

Before categorically answering the questions propounded by the resolution, I beg to refer to the statement concerning the organization and the business of the American Metal Co. contained in the report of the Alien Property Custodian for the year 1918 (S. Doc. 435, 65th Cong., 3d sess.). It will appear therefrom (pp. 72, 98) that from the very organization of the American Metal Co. in 1887 down to the outbreak of the European War, the stock control of the company

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was in the hands of Henry R. Merton & Co., a British concern, and Metallgesellschaft of Germany. This stock control continued up to the time when the Alien Property Custodian took over the stock belonging to the Germans. At that time the 70,000 shares of stock outstanding were divided as follows:

Name.	Number of shares.	Percentage of total.
		Per cent.
Henry R. Merton & Co. and associates	16,736	24
Metallgesellschaft and associates	34,644	49
American holders	81,620	27

The 18,620 shares owned by the American group were held as follows:

	Number of shares.
B. Hochschild	500
H. K. Hochschild	3,600
C. M. Loeb	2,000
Otto Sussman	1,000
Julius Goldman	1,600
Julius Loeb	400
Hilda G. Loeb	400
T. Stanfield	1,200
Gertrude Hochschild	2,500
Walter Hochschild, by Gertrude Hochschild and H. H. Hochschild, trustees	2,500
M. Schatt, by J. B. Beaty, attorney	200
Julian B. Beaty	100
H. V. Putzel	220
S. Adler	400
M. Roos	500
K. B. Heberlein	400
H. Bernstorff	100
Henry Bruere	100
Sol Roos, by M. Roos, attorney	600
William Simon, by M. Roos, attorney	100

All of the stockholders in the American group were citizens of the United States, living here, with the exception of K. B. Heberlein, holding 400 shares, who was a citizen of the Republic of Switzerland, living in the United States, and who has since been admitted to citizenship here. These stockholders of the American group were at this time and for many years had been the executive heads of the corporation and were in actual control of the board of directors and the management of the business of the corporation.

The American Metal Co. made a report to the custodian, as required by the trading with the enemy act, from which report it appeared that of the 70,000 shares of stock outstanding, 34,644 shares belonged to Germans, as follows, to wit:

	Number of shares.
Metallgesellschaft	18,180
Metallbank and Metallingischegesellschaft	15,180
Moritz Hochschild	60
P. Hochschild	60
W. Merton	650
Z. Hochschild	140
Dr. Roediger	24
Jennie Seeger	400
Richard Merton	40

In due course of the administration of his office the Alien Property Custodian made demand upon the American Metal Co. for the surrender of the stock certificates belonging to the Germans, to certain depositaries by the custodian designated, which demand was complied with, and thereafter said 34,644 shares of stock were transferred into the name of the Alien Property Custodian, or the directors named by him. On the 22d day of January, 1918, Messrs. Henry Morgenthau, George McAneny, E. C. Converse, Andrew W. Mellon, and Lewis L. Clarke were duly elected directors of the American Metal Co. (Ltd.), to represent on the board of directors the stock interest so transferred to the Alien Property Custodian. The corporation has 15 directors.

Mr. Morgenthau was this country's ambassador to Turkey. Mr. McAneny was prominently identified with the municipal government of the city of New York as president of the Borough of Manhattan and president of the board of aldermen of that city, and is now executive manager of the New York Times. Mr. Converse is a prominent citizen of New York and a director of many financial institutions, including the Bankers Trust Co. and Liberty National Bank of New York City. Mr. Mellon is a resident of Pittsburgh, prominently connected with financial institutions in Pennsylvania, such as the Union Trust Co. and Workingmen's Savings & Trust Co., and is a former trustee of the Carnegie Institution. Mr. Clarke is president of the Exchange National Bank of New York City.

Subsequently the Alien Property Custodian caused an investigation to be made of the books and records of the American Metal Co. for the purpose of determining whether there was any undisclosed German interest in the stock of the company in addition to the 34,644 shares reported by the company as enemy owned. Such investigation disclosed that there was no stock interest in the corporation in addition to said 34,644 shares.

On December 5, 1918, a voting trust agreement was made covering the stock of the American Metal Co. (Ltd.). I annex hereto a copy of said voting trust agreement. The voting trust was created at the instance of the Alien Property Custodian, and the reasons which prompted him to cause said voting trust to be established will be hereinafter stated. The American group of stockholders voluntarily put their stock into the voting trust. They were under no obligation to do so, and but for their voluntarily joining the voting trust the custodian with his minority stock could not have established an effective voting trust.

It will appear from the voting trust agreement that by the terms thereof the stock of the corporation was to be placed in the hands of five voting trustees, to be appointed by the Alien Property Custodian who, during the period of five years, should have control of the corporation. The Alien Property Custodian designated three of the five voting trustees, to wit, Henry Morgenthau, Joseph F. Guffey, and Berthold Hochschild, postponing the appointment of the two additional voting trustees until such time as the custodian should sell the enemy interest in the corporation which he had taken over, his purpose being to consider in the appointment of the two additional trustees the best interests of the purchasers of the enemy interest which the custodian had taken over.

The American group of stockholders deposited 18,420 of their 18,620 shares of stock in the voting trust, and the custodian deposited the 34,644 shares which he had taken over, so that there were in the voting trust 53,064 shares out of a total issue of 70,000 shares, or a little over 75 per cent of all the outstanding stock. The only stock not put in the voting trust is that owned by Henry R. Merton & Co. Efforts were made to induce that company to place its stock in the voting trust, but without success.

The result has been that whereas prior to the establishment of the voting trust the corporation was under the control of the American group of stockholders who held a minority of the stock, and the custodian, holding less than a majority of the outstanding stock, had but 5 of the 15 directors. Since the establishment of the voting trust the corporation has been under the absolute control of the voting trustees, all of whom were appointed by the Alien Property Custodian.

On the 7th day of April, 1919, pursuant to public notice given by advertisement, I offered for sale at public auction voting trust certificates representing the 34,644 shares of stock that the custodian had taken over. The highest bidder at said sale was the firm of Hayden, Stone & Co., of No. 25 Broad Street, New York City, whose bid was $140 per share. The custodian had not completed his investigation as to the qualifications of the persons interested in the bid within the statutory period of 30 days after the date of the sale, and the highest bidder declining to agree to an extension of the time, the bid was rejected, pursuant to an Executive order dated May 7, 1919.

On the 16th of November, 1919, pursuant to public notice given by advertisement, I offered for sale at public auction voting trust certificates representing the 34,644 shares so taken over by the custodian. Said sale was duly held, and the highest bidder at said sale was the firm of Charles D. Barney & Co., of 15 Broad Street, New York City, whose bid was $166 a share, or a total of $5,750,904. There was but one other bidder at said sale, to wit, J. E. Eddy, who represented one Joseph Mercadante, whose highest bid was $165 1/16 per share. Charles D. Barney & Co. made the bid for a purchasing syndicate, whose names and the amount for which each subscribed are as follows:

	Number of shares.
Ludwig Vogelstein	14,000
Cerro de Pasco Copper Corporation, by L. T. Haggin, president	4,500
L. T. Haggin	1,000
Edward H. Clark, attorney	1,000
Edward H. Clark	500
C. V. Drew	200
J. Horace Harding	1,000
H. C. Frick	1,000
Jay Cooke	244
Chas. D. Barney & Co	1,200
B. Hochschild	2,500
C. M. Loeb	1,000
Otto Sussman	1,000
Henry Bruce	650
J. Loeb	400
Harold K. Hochschild	3,100
Julian B. Beaty	650
Sol Roos	300
M. Roos	200
S. Adler	100
H. V. Putzel	100

Heretofore the Alien Property Custodian has enlisted the services of Messrs. Otto T. Bannard, Cleveland H. Dodge, and George H. Ingraham, of New York, and Ralph Stone, of Detroit, and B. H. Griswold, jr., of Baltimore, who have constituted the Advisory Sales Committee of the Alien Property Custodian. Before accepting the bid of Charles D. Barney & Co., I submitted it to the Advisory Sales Committee for its approval, as I have done in all other sales made by me as custodian, and the Advisory Sales Committee, after full consideration, approved the sale.

Mr. Bannard is president of the New York Trust Co. and a director of other financial institutions. He is a fellow of the Corporation of Yale University and active in charitable institutions. Mr. Dodge is a director of Phelps-Dodge Corporation, a director of a number of financial institutions, among others, the National City Bank and the New York Life Insurance & Trust Co., of New York, a trustee of the Russell Sage Foundation, and president of the board of trustees of Roberts College of Constantinople and other educational and charitable institutions. Mr. Ingraham is former presiding judge of the Appellate Division of the Supreme Court of New York. Mr. Stone lives in Detroit and is president of the Detroit Trust Co. Mr. Griswold is a member of Brown Bros., an international banking firm in Baltimore.

Representatives of Mr. Mercadante asked to be present at the meeting of the Advisory Committee when they passed upon the bid. Mr. Mercadante himself and his counsel were present. After a full hearing, the Advisory Committee, with the exception of Mr. Stone, who was not present, voted to recommend to the Alien Property Custodian the acceptance of Barney & Co.'s bid.

On the 7th day of January, 1920, Barney & Co. completed their purchase of the voting trust certificates by the payment of the purchase price in full, and I delivered to them the voting trust certificates representing the 34,644 shares of stock.

On January 6, 1920, the voting trust agreement was amended so as to provide for seven instead of five voting trustees, and thereafter I appointed as the four additional voting trustees Messrs. Frank L. Crocker, Charles B. De Camp, John P. Grier, and Ludwig Vogelstein. Messrs. Grier and Vogelstein were named at the suggestion of the purchasers of the voting trust certificates. Mr. Hochschild is the chairman of the board of directors of the American Metal Co. and one of its founders. I regard Messrs. Morgenthau, Guffey, Crocker, and De Camp, who comprise a majority of the voting trustees, as direct representatives of the guaranty of full Americanization of this company.

ANSWER TO THE SPECIFIC QUESTIONS.

First. The resolution asks for the names of the purchasers of the voting trust certificates, the number of certificates purchased by each, and the relations, if any, of each purchaser to the former German owners of such American Metal Co. The names of the purchasers and the number of certificates purchased by each are as follows:

	Number of shares.
Ludwig Vogelstein	14,000
Cerro de Pasco Copper Corporation, by L. T. Haggin, president	4,500
L. T. Haggin	1,000

	Number of shares.
Edward H. Clark, attorney	1,000
Edward H. Clark	500
C. V. Drew	200
J. Horace Harding	1,000
H. C. Frick	1,000
Jay Cooke	244
Charles D. Barney & Co	1,200
B. Hochschild	2,500
C. M. Loeb	1,000
Otto Sussman	1,000
Henry Bruére	650
J. Loeb	400
Harold K. Hochschild	3,100
Julian B. Beaty	650
Sol Roos	300
M. Roos	200
S. Adler	100
H. V. Putzel	100

The Cerro de Pasco Copper Corporation, L. T. Haggin, its president, Edward H. Clark, C. V Drew, J. Horace Harding, Henry C. Frick, Jay Cooke, and Charles D. Barney & Co., who together purchased voting trust certificates representing 10,644 shares, are citizens of the United States, who, as far as I have been able to discover, have had no relations with the Metallgesellschaft, the Metallbank or the Metallurgischegesellschaft or the other former owners of the stock taken over by the custodian. All the members of Charles D. Barney & Co. and the other individuals above mentioned are native born American citizens of the highest reputation. Charles D. Barney & Co. is a very large banking firm in the City of New York. The Americanism of Henry C. Frick, who died only a few weeks ago, or of L. T. Haggin or of J. Horace Harding and their associates in the purchase of these voting trust certificates, can not be questioned. The Cerro de Pasco Copper Corporation is an American corporation and my investigation discloses that it is controlled by American citizens of unquestioned loyalty, among whom are L. T. Haggin, the Haggin estate, J. Horace Harding, John P. Grier, and the estate of H. C. Frick.

The other members of the purchasing syndicate, with the exception of Ludwig Vogelstein, are stockholders of the American Metal Co. (Ltd.), who comprise what I have herein designated as the American group, as distinguished from the German group and the Merton group. These are the stockholders who placed their stock in the voting trust. They are the men who have for years managed the corporation and now comprise the majority of the Board of Directors of the corporation. I know of no relation of any of these men to the former German owners of the stock except such relation as they sustained as officers, executive heads and directors of the corporation to the former German owners of the stock who controlled 49 per cent thereof. There is a blood relationship between two of the former owners of stock and two of the purchasers in the purchasing syndicate, to wit: F. Hochschild and Moritz Hochschild, each of whom owned 60 shares of stock, are nephews of Berthold Hochschild, who is a participant in the syndicate, and are cousins of Harold K. Hochschild, a son of Berthold Hochschild, and also a participant in the purchasing syndicate.

As set forth in the custodian's report to Congress for the year 1918, the business relations between the American Metal Co. (Ltd.), and the Metallgesellschaft in Germany and Henry R. Merton & Co. in Great Britain, were very close, but since the European war broke out, those relations ceased, and during the war between this country and Germany, and at all times since the custodian has been represented on the board of directors of the company by five directors, and since the corporation has been under the control of the voting trustees appointed by the custodian, there have been, so far as I know, no relations between the former German owners of this stock and the American Metal Co. or any of its officers or directors or employees who appear as participants in the purchasing syndicate in question. All of these participants who are connected with the American Metal Co. (Ltd.), are and have, for years prior to the outbreak of the European war, been American citizens.

Second. I am asked for the reasons for and the circumstances surrounding the sale of a large portion of such voting trust certificates to Ludwig Vogelstein in view of the reference to him on pages 92 and 93 of the report of the Alien Property Custodian for 1918.

Ludwig Vogelstein has been in the United States since November, 1896, and has been a citizen of the United States since May, 1903. He was a member of the purchasing syndicate of the American Metal voting trust certificates to the extent of voting trust certificates representing 14,000 shares. His participation gives him 20 per cent of the outstanding stock of the American Metal Co. He arranged to take this large participation because he had agreed to a sale of his business (L. Vogelstein & Co. (Inc.)), to the American Metal Co.

As appears from the custodian's report for 1918, Vogelstein was at the time of the outbreak of the European war a representative in this country of Aron Hirsch & Sohn, of Germany. The custodian took over the interest of the Germans in the stock of L. Vogelstein & Co. (Inc.), and subsequently an arrangement was made with Vogelstein whereby all of the stock of the corporation was placed in a voting trust, the custodian naming two of the three voting trustees. Vogelstein has paid to the custodian on account of the indebtedness due from him to Aron Hirsch & Sohn something in excess of $3,000,000, and upon final accounting between Vogelstein & Co. (Inc.) and A. Hirsch & Sohn an additional amount may be found to be due to the Hirsch firm, which will be paid to the custodian.

Pages 92 and 93 of the custodian's report for 1918, referred to in the resolution, dealt not only with Vogelstein and his company, but also with Beer, Sondheimer & Co., of Frankfort, Germany, and their branch in the United States, which the custodian likewise took over, and with the American Metal Co. and its relation to Metallgesellschaft and Henry R. Merton & Co. There is nothing on those pages or in the entire report or in the history of these concerns and their relation to the Alien Property Custodian that would militate against or make it improper for the Alien Property Custodian to permit Vogelstein to be a member of the purchasing syndicate of the voting trust certificates here involved. On the pages mentioned, and, indeed, throughout the report the custodian sought to point out the danger of continuing the German control in the three American branches of the German metal triumvirate. The point was made that despite the fact that the American Metal Co. was officered by Americans, the stock control

of the company, nevertheless, lay in German hands, and despite the fact that Vogelstein, who ran the American end of the business of Aron Hirsch & Sohn, was an American citizen, Aron Hirsch & Sohn, nevertheless, had the largest share in the ownership of the business, and that the American branch of Beer, Sondheimer & Co. was entirely owned by Beer, Sondheimer & Co. of Frankfort. In brief, that the American character of those in immediate control of these German branches in America was no guarantee that the Germans who owned the branches would not after the war continue to operate them as German concerns. As pointed out in the report, the custodian sought not only to take possession of all the alien interest in these German branches, but also to eliminate, as far as possible, for all time, German interests and German influences which existed and had been exercised in this country through the control of these three companies.

I believe that what the custodian has accomplished in connection with the American Metal Co. has been in line with the purposes thus expressed, and, as far as that company is concerned, has fully accomplished that desired end. As the American Metal Co. now stands it is in the hands of Americans. Every share of stock, with the exception of that owned by Henry R. Merton & Co., a British concern (about 24 per cent of the total), is owned by United States citizens. The control of the corporation is in the hands of seven voting trustees, all citizens of the United States, and all appointed by the Alien Property Custodian. This voting trust is to be in existence for a period of five years. Every officer and managing head of the company is a citizen of the United States. No person was permitted to share in the sale of these voting-trust certificates whose loyalty to this country during the late war was not established and who was not an American citizen with all his interests and connections centered in this country. Every vestige of German ownership or control in this corporation has been eliminated.

Third. I am asked for the provisions of law, if any, authorizing and the reasons for the formation of a voting trust and the sale of voting-trust certificates in lieu of the sale of shares of stock taken from the alien-enemy holders thereof.

It requires little argument to establish the advantage of a voting trust. The custodian had but a minority of the outstanding stock of the American Metal Co. With such minority he was in no position to control the affairs of the corporation. Under the voting trust, however, he has the power, and has exercised it, of appointing all of the voting trustees, who through the election of directors and the exercise of all the powers of stockholders have the control and management of the corporation.

The American Metal Co. is a corporation organized and existing under the laws of the State of New York. Its main office is located in the city of New York. Under the laws of the State of New York the capital stock of a corporation may be placed in a voting trust for a period not exceeding five years. (General Corporation Law, sec. 25.) The voting trust in this instance was made for a period of five years, beginning December 5, 1918. The custodian could have sold the stock, 34,644 shares, and have taken no trouble to establish a voting trust, but the result would have been that the purchasers of that stock could have immediately turned around and sold it back to the Germans. By placing it in a voting trust, however, the Govern-

ment is assured that during the duration of the trust, at least, the stock will remain in American hands.

The right of the custodian to place in a voting trust with other stockholders stock of a corporation which he has taken over as enemy-owned property has never been doubted. He holds the legal title to the property so taken over. Consequently, he can pass title to such property. In this case he passed the title to the 34,644 shares of stock to the voting trustees for the limited purpose of having the same placed in the name of the voting trustees for the purpose of the voting trust.

Fourth. I am asked for all other pertinent facts in connection with the sale and transfer of such voting-trust certificates and the issuance and award of such certificates by the Advisory Committee.

Other than as above set forth no other facts suggest themselves to me as pertinent to the resolution. I shall, of course, be glad at all times to give to the Senate any further information that it may desire in this matter, or in any other matter in my charge as custodian.

Respectfully submitted.

FRANCIS P. GARVAN,
Alien Property Custodian.

To the PRESIDENT OF THE UNITED STATES SENATE.

VOTING TRUST AGREEMENT.

[The American Metal Co. (Ltd.), owners of stock in the American Metal Co. (Ltd.), and Joseph F. Guffey, Henry Morgenthau, Berthold Hochschild, voting trustees. Dated Dec. 5, 1918.]

Agreement, made in the City of New York, the 5th day of December, 1918, between such owners of stock in The American Metal Co. (Ltd.), as may become parties to this agreement in the manner hereinafter provided (hereinafter termed stockholders), parties of the first part, and Joseph F. Guffy, Henry Morgenthau, Berthold Hochschild, and such others as may be appointed voting trustees hereunder in the manner hereinafter provided (hereinafter called the voting trustees), parties of the second part.

Whereas The American Metal Co. (Ltd.) (hereinafter called the company) is a corporation organized under the laws of the State of New York, with an authorized capital stock of $25,000,000 of which $7,000,000, divided into 70,000 shares of the par value of $100 each, is issued and outstanding; and

Whereas since April 3, 1918, 34,644 shares of said stock, constituting approximately 49 per cent thereof, have been acquired and are now held by A. Mitchell Palmer as the Alien Property Custodian appointed by the President of the United States to receive and hold the same pursuant to the act of Congress approved October 6, 1917, known as the trading with the enemy act and acts amendatory thereof, as the property of persons designated as enemies of the United States by the provisions of said act of Congress; and

Whereas all of the remaining shares of the stock of the company are held by citizens of the United States or of countries cooperating with the United States in the prosecution of the war, including stockholders who now constitute the board of directors and executive officers of the company, and all of said stockholders together with said Alien Property Custodian deem it to be for the best interests of the company and its stockholders that the continuity of an American management of the company shall be ensured by the deposit of their stock with the voting trustees hereunder: Now, therefore, in consideration of the premises:

First. Each stockholder subscribing this agreement hereby agrees to transfer to the voting trustees the stock in the company held by him, by delivering to the voting trustees the certificates for said stock, duly endorsed in blank or accompanied by proper instruments of assignment and transfer thereof in blank duly executed, and in either case properly stamped for transfer. Any owner of stock in the company may at any time become a party to, and shall be bound by the provisions of, this agreement by signing the same and by such delivery of certificates. The voting trustees, how-

ever, may at any time, in their discretion, permit any owner of stock in the company to become a party to this agreement, without signing the same, solely by delivery of certificates of stock in the manner aforesaid and by accepting in respect thereof one or more voting trust certificates issued under this agreement, and such owner by such acceptance shall become a party to, and be bound by the provisions of, this agreement.

Second. The voting trustees hereby agree with the stockholders, and with each and every holder of voting trust certificates issued as hereinafter provided, that, from time to time, upon request, they will cause to be issued to the stockholders or upon their order, in respect of all stock so transferred to the voting trustees and so by them received from the stockholders, voting trust certificates in substantially the following form:

[Form of voting trust certificate.]

No. ——. —— shares.

STATE OF NEW YORK, THE AMERICAN METAL CO. (LTD.).

VOTING TRUST CERTIFICATE.

This is to certify that, as hereinafter provided, ——— will be entitled to receive on November 1, 1923, a certificate or certificates, expressed to be fully paid for ——— shares of the par value of $100 each, in the capital stock of the American Metal Co. (Ltd.) (hereinafter called the company), a corporation of New York, and in the meantime will be entitled to receive payments equal to the dividends, if any, collected by the undersigned voting trustees upon a like number of such shares standing in their names. Until after the actual delivery of such stock certificates, the voting trustees shall possess, in respect of any and all such stock, and shall be entitled, in their discretion, to exercise all rights of every name and nature, including the right to vote and consent for every purpose, it being expressly stipulated that no voting right as a stockholder passes to the holder of this voting trust certificate by implication or otherwise.

This voting trust certificate is issued pursuant to, and the rights of the holder hereof are recited in, and subject to, the terms and conditions of a certain voting trust agreement dated the 5th day of December, 1918, between owners of stock in the company and Joseph F. Guffey, Henry Morgenthau, Berthold Hochschild, and such others as may be appointed voting trustees thereunder in the manner therein provided, which agreement provides, among other things, for the rights of the holders of the voting trust certificates issued pursuant thereto in respect of any dissolution, merger, or consolidation of the company, the increase of its capital stock, the sale of its assets, or the creation of any mortgage thereon.

No stock certificates shall be due or deliverable hereunder before the 1st day of November, 1923, but the voting trustees in their discretion may make earlier delivery.

This voting trust certificate is transferable at the agency of the voting trustees by the registered holder, either in person or by attorney duly authorized, in accordance with rules established for that purpose by the voting trustees and on surrender hereof; and until so transferred the voting trustees may treat the registered holder as owner hereof for all purposes whatsoever, but they shall not be required to deliver stock certificates hereunder without the surrender hereof. In connection with, and as a condition of, making or permitting any transfer or delivery of stock certificates or voting trust certificates, the voting trustees under said agreement may require the payment of a sum sufficient to pay or reimburse them for any stamp tax or other governmental charge in connection therewith.

This voting trust certificate is not valid unless duly signed on behalf of the undersigned voting trustees by ———, their agent, and also registered by ———, registrar.

In witness whereof the voting trustees have caused this voting trust certificate to be signed by ———, their duly authorized agent for that purpose, this ——— day of ———, 19—.

———,
———,
———,
Voting Trustees.

By ———,
Their Agent.

Registered.

———, *Registrar.*

By ———,

Third. The certificates for stock of the company transferred to the voting trustees as aforesaid shall be surrendered by the voting trustees to the company and canceled, and the certificates therefor shall be issued to the voting trustees, in which it shall appear that such certificates are issued pursuant to this agreement, and in the entry of the voting trustees as owners of such stock in the proper books of the company that fact shall also be noted. Duplicates of this agreement shall be filed in the office of the company in the city of New York and in the office in said city of the registrar of said voting trust certificates.

Fourth. On the 1st day of November, 1923, or whenever earlier the voting trustees in their discretion shall decide to make such delivery, the voting trustees in exchange for and upon surrender of any voting trust certificate then outstanding will, in accordance with the terms thereof and subject to article 7 hereof, deliver at their office or agency in the Borough of Manhattan, in the city of New York, certificates of stock of the American Metal Co. (Ltd.) aforesaid to the amounts called for by the respective voting trust certificates and may require the holders of the voting trust certificates to exchange them for such certificates of stock.

Whenever, pursuant to the foregoing provisions of this article 4, certificates for stock of the company shall become deliverable, or at any time thereafter, the voting trustees may deposit with any bank or trust company in good standing having an office in the Borough of Manhattan, in the city of New York, the stock certificates so deliverable, duly indorsed in blank or accompanied by proper instruments of assignment and transfer in blank, duly executed, to a par amount equal to the par amount of stock called for by the outstanding voting trust certificates, with authority to such depositary to make delivery of such stock certificates, subject to article 7 hereof, in exchange for the proper voting trust certificates, and thereupon all further obligation or duty of the voting trustees under this agreement to the holders of voting trust certificates shall terminate.

Fifth. The voting trustees may cause to be issued hereunder temporary printed voting trust certificates conforming generally to the form hereinbefore set forth and may cause the same to be exchanged for definitive voting trust certificates in substantially said form.

The voting trust certificates issued hereunder shall be transferable by delivery thereof when duly assigned in writing by the registered holders thereof, either in person or by attorney duly authorized; but until transfer thereof on the books of the voting trustees in accordance with rules established for that purpose by them, the voting trustees may treat the registered holders as owners thereof for all purposes whatsoever, but the voting trustees shall not be required to deliver stock certificates hereunder without the surrender of the voting trust certificates calling therefor. The transfer books for voting trust certificates may be closed by the voting trustees at any time prior to the payment or distribution of dividends or for any other purpose.

In connection with, and as a condition of, making or permitting any transfer or delivery of stock certificates or voting trust certificates, the voting trustees may require the payment of a sum sufficient to pay or reimburse them for any stamp tax or other governmental charge in connection therewith.

Sixth. Prior to the delivery, pursuant to article 4 hereof, of certificates of stock of the company in exchange for voting trust certificates, or the deposit, pursuant to said article, of stock certificates for the purpose of such delivery, the holder of each voting trust certificate shall be entitled to receive from time to time payments equal to the dividends, if any, collected by the voting trustees upon a like number of shares of stock of the company as is called for by such voting trust certificate; provided, however, that if any such dividend shall be paid in fully paid stock of the company the voting trustees shall likewise hold, subject to the terms of this agreement, the certificates for stock which shall be received by them on account of such dividend, and the holder of each voting trust certificate shall be entitled to receive one or more proper voting trust certificates issued under this agreement for stock to the amount received by the voting trustees in payment of the dividend upon the number of shares of stock called for by such voting trust certificate. The voting trustees shall not in any event be required in respect of any such dividend in stock to deliver voting trust certificates calling for a fraction of a share, but may in lieu thereof deliver in respect of fractional interests script in such form as the voting trustees may, in their discretion, determine.

In case the company shall determine to increase the amount of its outstanding stock and such stock shall be offered to its stockholders for subscription, then in such case upon receiving from the holder of any voting trust certificate, prior to the time limited by the company for subscription and payment, a request to subscribe in his behalf and the money required to pay for a stated amount of such increased stock (not in excess of the ratable amount subscribable in respect of the stock represented

by such voting trust certificate), the voting trustees will make said subscription and payment and, upon receiving from the company the certificates for the stock so subscribed for, will issue one or more voting trust certificates in respect thereof to the holder of the voting trust certificate who shall have made such request or payment.

Seventh. The number of the voting trustees may at any time be increased to five by the appointment, by the Alien Property Custodian, of two additional voting trustees. Such appointment shall be made by instrument in writing which shall be filed with this agreement in the office of the agent of the voting trustees for the transfer of voting trust certificates. Any voting trustee may, at any time, resign by instrument in writing addressed to the other voting trustees and delivered at the office of the said transfer agent, and in every case of death, resignation, or inability to act, of any voting trustee, the vacancy so occurring shall be filled by the appointment by a majority of the other voting trustees of a successor or successors, by a written instrument, filed in the office of said transfer agent, together with the approval in writing of such appointment, also filed in said office, of the Alien Property Custodian duly designated to act and then acting under said trading with the enemy act if there shall then be any such Alien Property Custodian; provided that in case of the death, resignation, or inability to act of said Berthold Hochschild, Carl M. Loeb, of the city of New York, is hereby appointed and constituted his successor. Any additional or successor voting trustee appointed as aforesaid shall have all the powers of a voting trustee hereunder, and the term "Voting trustees" as used herein, and in said voting trust certificates, shall apply to the parties of the second part and their successors hereunder. Notwithstanding any change in the voting trustees, the voting trustees for the time being may adopt and issue voting trust certificates in the names of the original voting trustees, the parties hereto of the second part. The voting trustees shall have full power to appoint a secretary of the voting trustees and also from time to time agents to receive deposits of stock in the company on their behalf, and agents and registrars to sign in their behalf and transfer and register the voting trust certificates, and to fix the compensation of such secretary and other agents and registrars Such agent to sign voting trust certificates shall at all times be a bank or trust company and shall as depositary have custody of the certificates for all stock deposited hereunder, subject to the orders of the voting trustees. Every such order shall be full protection to the depositary acting in accordance therewith. The voting trustees shall be entitled to reasonable compensation for their services in such amounts as may be approved by the board of directors of the company. Such compensation, as well as the compensation of the secretary of the voting trustees and of any agents and registrars appointed by them, and all other expenses of the voting trustees, shall be paid by the company.

Eighth. The action of a majority of the voting trustees, expressed from time to time at a meeting or by writing without a meeting, shall constitute the action of the voting trustees and have the same effect as if assented to by all; provided that if such action be by writing without a meeting, unless signed by all the voting trustees, it shall not be effective until the expiration of five days after a copy of such writing be delivered to each voting trustee or mailed postpaid addressed to each of them at his address as registered with the secretary of the voting trustees. At any meeting of the voting trustees, any voting trustee may vote in person or by proxy to any other voting trustee; and any voting trustee may give a power of attorney to any other voting trustee to sign for him in case of action of the voting trustees taken in writing without a meeting. The voting trustees may adopt their own rules of procedure. Any voting trustee may act as a director or officer of the company or any controlled or subsidiary company, and he, or any firm of which he may be a member, or any corporation of which he may be a stockholder, director, or officer, may, to the extent permitted by law, contrac with the company or any controlled or subsidiary company as fully as though he were not a voting trustee.

Ninth. Until delivery or deposit of all the stock certificates in accordance with article 4 hereof, the voting trustees shall possess, in respect of any and all stock deposited hereunder, and shall be entitled, in their discretion, to exercise all the powers of absolute owners of said stock, including the right to vote and consent for every purpose and to receive dividends on said stock: and no such voting or other right or power shall pass to holders of voting trust certificates or to others by or under the voting trust certificates, or by or under this agreement, or by or under any agreement, whether by implication or otherwise. The voting trustees will not, however, during the continuance of this agreement, vote in respect of the shares of the capital stock of the company held by them hereunder to authorize (1) the dissolution of the company, or (2) the merger of the company into or its consolidation with any other corporation, or (3) the increase of the authorized capital stock of the company, or (4) the sale or other disposition of the whole or the greater part of the properties of the

company, or (5) the creation of any mortgage upon the properties of the company, unless with the consent in each instance given in writing (which consent may be given without a meeting) or by the vote (either in person or by proxy) at a meeting called by the voting trustees for the purpose upon notice to be given as hereinafter in article 10 hereof provided, of the holders of voting trust certificates in respect of at least two-thirds of the stock of the company at the time subject to this agreement.

In voting the stock held by them (which they may do either in person or by proxy to any one or more of them or to any other person or persons), the voting trustees will exercise their best judgment from time to time to select suitable directors, to the end that the affairs of the company shall be properly managed, and, in voting and in acting on other matters which may come before them at any stockholders' meeting, will exercise like judgment; but they assume no responsibility in respect of such management or in respect of any action taken by them or in pursuance of their consent thereto as such stockholders, or pursuant to their votes so cast, and no voting trustee incurs any responsibility by reason of any error of law or of any matter or thing done or omitted under this agreement, except for his own individual malfeasance.

Tenth. All notices to be given to the holders of voting trust certificates hereunder shall be published in a daily newspaper of general circulation published in the city of New York once in each week for four successive weeks and a copy of such notice shall also be mailed, post paid, addressed to each holder of voting trust certificates at his address as registered on the books of the transfer agent appointed by the voting trustees on or before the day of the first publication thereof. Any notice whatsoever, when so published and mailed, shall be taken and considered as though personally served on all holders of voting trust certificates, and upon all parties becoming bound hereby, as of the date of the commencement of publication thereof, and such notice shall be the only notice required to be given under any provision of this agreement.

Eleventh. This agreement may be executed in several counterparts, each of which, so executed, shall be deemed to be an original, and such counterparts shall together constitute but one and the same instrument.

In witness whereof the voting trustees, the parties of the second part, have signed this agreement in the city of New York, and the parties of the first part have signed this agreement or have transferred and delivered their stock and accepted voting trust certificates issued under this agreement, all as of the day and year first hereinabove mentioned.

———— ————.
———— ————,
———— ————,
Voting Trustees.

Owners of stock in the American Metal Co. (Ltd.): Names ————. Number of shares ————.

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BOSTON MAN GETS SMELTER

Joplin Paper Says Easterners Interested in Zinc Mines Bought in LaHarpe Works.

Some time ago the Register told of a visit here of a party of Boston and other eastern men to visit Mr. George Braun, builder of the new smelter at LaHarpe. It was hinted at the time that the visit probably was an inspection tour with a view to buying at least an interest in the plant.

A Joplin dispatch of October 19 places this interpretation on the deal:

Word was received here today of the purchase of the LaHarpe Spelter company's plant by the American Zinc, Lead and Smelting company of Boston, that owns extensive mining interests in the Joplin district. The company may erect an addition to the plant this winter, according to the latest scientific principles, under the direction of Walter Renton Ingalls, the New York authority on zinc.

The sale, if made as suggested, means ample capital for the new works and so the city of LaHarpe need not feel aggrieved.

NATURE'S OWN CURE.

Hyomei Cures Catarrh Without Dangerous Drugging of the Stomach.

Not until Hyomei was discovered has it been possible to truthfully say that a remedy for catarrh was known.

This remedy is breathed through the Hyomei inhaler for a few minutes four times a day, and during that time every particle of air taken into the lair passages and lungs is impregnated with the germ killing and health giving Hyomei. It is the only treatment that cures catarrh.

Stomach drugging often causes disordered digestion or brings on some other diseases and never makes a permanent cure of catarrh. Hyomei not only kills the germs in the throat and

K. P.'s Install Officers.

The Knights of Pythias installed their new officers last night and the solemn function was the beginning of a revelry that lasted until a late hour. The formal work had barely been completed when the Rathbone Sisters, bringing oysters and refreshments in abundance, were admitted by the outer guard, and the Knights of Pythias without a struggle were metamorphosed into Knights of the Spoon and Fork. A general jollification followed the spread and everyone seemed to have a fine time.

The new officers are as follows: D. H. Pingree, C. C.; R. M. Friebel, V. C.; F. Curnow, P.; F. M. Kelley, M. of W.; Geo. Bedell, K. of R. & S.; J. R. Pepper, M. of F.; Melvin Fronk, M. of E.; Harry Small, M. of A.; D. M. Bixler, I. G.; R. B. Porter, O. G.

An Indianapolis Exchange Says:

"In a colored band every man imagines himself leader," was a remark made with a laugh by Prof. W. E. Handy, the genial director of music for Mahara's Big Minstrel Company when interviewed last evening after the company's magnificent performance at the opera house. The professor, as all lovers of music know, is famous as a cornet and violin virtuoso, a composed, and as a band leader is called the "Colored Sousa" and it was only after considerable wire pulling and an offer of a fat salary that the Maharas induced him to resign his position at the ——— college (which by the way is the largest institution of its kind in the world) to direct the musical affairs of the Southern organization. Mahara's Minstrels last evening gave the most up-to-date clever minstrel show ever seen here. The company plays at the A. O. U. W. opera house for one night only, Thursday, Oct. 22.

New Basis for Kansas Oil.

Presumably as the result of the re-

For 28 gravity (fuel oi

And so henceforth the quality of oil pr ceive more attention than quantity.

Concert Tomor

The band will give i ly concert in the park commencing promptly Four of the selections are entirely new pie been received by the

The following is the March, the King's Fl

....

Overture, Old Gold

Medley, Sounds From

....

Hostrauser's March

Selection, Wang ...

Waltz, "J'ai Reve de

March, Alagozam ...

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W. A. CROOKS, EDITOR.

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Vol. VI. October 5, 1903. No. 9.

Due recognition of the merits of zinc sheets as a roofing material is planned by the Director of Works of the Louisiana Purchase Exposition. The temporary character of the Exposition buildings naturally precludes the use of zinc as a roofing material on such work, cheaper materials answering as well during the very short life of the buildings However, Director of Works Taylor has prepared designs for a building to be surmounted by two domes, one of which is to be covered with zinc and the other with copper. The designs are striking and beautiful, the roofing materials affording a strikingly marked contrast. The construction of these domes will afford an excellent opportunity for the display of the adaptability of sheet zinc for roofing purposes and one which will be regarded by architects the country over as of decided value.

* * *

Incidentally it developes that Director of Works Taylor is a thorough believer in the merits of sheet metal roofs, he having given the subject his personal consideration for many years. So are other leading architects of the country. A demonstration of the application of zinc in architectural construction, as it now prevails on the Continent and especially in France and Belgium, would be of especial value to all arcbitects and builders who are seeking after the welfare of their clients and for good work. Manufacturers of sheet metal roofing materials have before them a very excellent opportunity to make such an exhibit of their products and the correct methods of the application of sheet metal roofs a source of no little profit to themselves and to do much to popularize such roofs throughout the architectural profession of this and other countries.

* * *

It developed recently that the long life of sheet zinc for roofing purposes in the United States has been demonstrated by as severe a test as most architects and builders would demand. In southern Wisconsin a sheet zinc roof was constructed of zinc in 1854 and since then it has been subjected to all the climatic changes which have occurred in that portion of the Mississippi Valley. The roof bas never cost the owner of the building a single dollar for repairs and careful examination of the sheets which composed the roof, made during the past few weeks has proven that the exposure of half a century bas wrought no injury thereto. From the appearance of the roof to-day there is every reason to believe that the roof will serve equally well for another half century. Tbe showing is decidedly valuable to the zinc industry and a portion of this roof is to form one of the exhibits which will be installed at the World's Fair.

* * *

With the certainty that tbe proper officials of the Louisiana Purchase Exposition are in sympathy with the effort to make a proper demonstration of the utility and value of zinc as a roofing material, manufacturers of such products should avail themselves of the opportunity to place their manufactures before the hundreds of architects and builders who will be in attendance at the World's Fair. Several manufacturers of zinc and zinc products have already announced their intention to make an adequate exhibit and it is expected that their missionary work will result in much good to the industry as a whole.

* * *

During the past week a number of former union miners from the Coeur d'Alenes entered the Cripple Creek district of Colorado to take the places of strikers in that district. Such a step was hardly anticipated by the strikers, although it has been generally understood that since the failure of tbe strike some years past in the Coeur d'Alenes, the union had little or no standing with most of the miners in that field. Strike breakers from a number of other mining districts have also entered the district and with the miners who have returned to work, a number of the leading mines are working steadily increasing forces. Apparently tbe operators of the principal mines of Colorado have realized that the present struggle must he fought to a finish, and the prospects at tbis writing favor the operators in their figbt upon the union. Several suits for personal damages have been filed against Governor Peabody and tbe officials in command of the militia, as a result of tbe action of the militia, and the feeling is one of no little bitterness, the outcome of which will be watched with interest by the operators of mines in other states, manned by miners belonging to the same organization as do the Cripple Creek miners. The strike thus far has materially reduced the production of Colorado and is costing mine owners and miners thousands of dollars each day tbe struggle is prolonged.

* * *

The continued firmness of the lead ore market in the Joplin district continues a source of profit to the producer of lead in that field. It will he remembered that a fortnight past another advance in the price of lead was announced, making the price of lead $56 per ton. The price of lead at the corresponding period of 1902 was only $49.50 per ton. The advent of new smelters in the district increased competition and as a result the producer has been profiting, as the smelters' margins have been reduced. Tbe lead concentrates of the Joplin district average about 75 per cent metallic lead; estimating the recovery of lead at 95 per cent at the present St. Louis market value ($4.325 per 100 pounds), the total value of pig lead recove

EPA7-001915

SPELTER MARKET EASIER.

Demand for October Deliveries Lighter Than Anticipated.

St. Louis, Oct. 3.—The spelter market has developed the slightly weaker tone predicted in these market reports four weeks ago. The closing quotation today for October delivery was 5.60, while November delivery could be had for 5.50. It is a peculiar fact that October was quoted at 5.60 some 30 days ago, which quotation was held firm during the entire month of September. Had the market today been on the same basis it was on September 3, the quotation should have been 5.65. No marked break in spelter prices may be anticipated, however, although the market at present does not invite the operations of speculators.

As generally understood September deliveries were well sold up during the latter week of August and that only a few small sales of metal for prompt delivery were made during the last three weeks of the month. So far the production of October has been fairly well sold up during the month just ended, owing to the attitude of the principal selling agents in holding their metal stiffly. The demand for spelter during the past two weeks has not been so satisfactory and as a result the past week's operation was dropped from 5.65 to 5.60 on Monday, which figure has been named during the week. Sales of metal have been of ordinary volume but as regarded in comparison with the very excellent demand which ruled during August and September, must be regarded as weaker. That the smelters themselves recognized this fact was evidenced by the fact that a number of ore buyers in the Joplin district have reduced prices from $1 to $2 per ton during the past ten days.

The week ending to-night has been featureless, with some demand for metal on the part of one firm which sold short a month or six weeks. The week's receipts were 47,995 slabs, against 26,855 slabs last week, the total shipments during the fortnight aggregating 90,835 slabs, the apparent difference between receipts and shipments being largely due to the production of the Carondelet smelter of the Edgar Zinc Company.

As published elsewhere in this issue, it will be noticed that the Braun smelting plant at La Harpe, Kan., has passed into the control of the group of Boston capitalists which have been dominating the affairs of the American Zinc, Lead and Smelting Company, of Joplin, Mo., and Boston. This company has been endeavoring to get into the zinc smelting industry for months past and furnished a portion of the money which built the Braun plant. Advices from Iola, Kan., declare that the Boston crowd have purchased outright the Braun smelter, although it is not yet known whether or not they will operate it under the name of the Braun Smelting Company or the American Zinc, Lead and Smelting Company. It is also reported that William Lanyon, present manager of the United Zinc and Chemical Company, of Iola, is to start construction of a four-block smelter at Caney, Kan.

Following were the local spelter statistics for the week ending Sept. 26, 1903.

	Rects 1903	Rects 1902	Shipts 1903	Shipts 1902
Monday	2,055	905	5,610	9,030
Tuesday	4,715	7,080	13,455	15,480
Wednesday	8,115	5,365	3,080	7,765
Thursday	4,175	9,485	9,135	11,755
Friday	1 200	7,265	7,195	4,745
Saturday	7,595	3,130	5,110	7,130
Total	26,855	33,230	46,455	53,945
Total last week	32,820	41,320	45,275	45,300
Year to date	1,511,445	1,794,180	1,841,356	1,884,940

Following were the local spelter statistics for the week ending Oct. 3, 1903:

	Rects 1903.	Rects. 1902	Shipts. 1903.	Shipts 1902.
Monday	11,585	6,390	10,235	14,115
Tuesday	13,610	25,485	6,265	9,765
Wednesday	7,425	5,575	10,330	15,195
Thursday	7 500	9 210	9,640	12,915
Friday	4 760	1,305	5,875	10 485
Saturday	3 115	1 850	7,915	6,965
Total	47,995	49,655	50,380	68,560
Total last week	26,855	33,230	46,455	53,945
Year to date	1,559,440	1,843,815	1,891,748	1,958,800

Following was the range of prices on spelter at the points named during the fortnight ending Oct. 3, 1903:

	St Louis	New York	London.
Monday	*5 75	$6 00	£21 2s 6d
Tuesday	†5 65	$6 00	21 0 0
Wednesday	†5 65	†5 70@5 75	21 0 0
Thursday	*5 75	†5 70@5.75	21 0 0
Friday	†5 65‖	†5 70@5 725	21 0 0
Saturday	†5 65‖	$6.00	21 0 0
Monday	† 5 65‖	†5 65	20 17 6
Tuesday	†5 50@5 60	†5 75	20 15 0
Wednesday	†5.60	†5 80@5 85	20 15 0
Thursday	†5 60	$6 00	20 15 0
Friday	†5 50@5 60	†5 80@5.85	20 15 0
Saturday	†5 60	†5 70@5 75	. .

*September delivery. †October delivery. ‡October-November delivery. §Spot. ‖F. T.

Spelter Easier in East.

New York, Oct. 3.—The past few days has seen an appreciably easier tone in the spelter market, the quotations on futures being slightly lower than the normal parity with St. Louis quotations, as sent out from that city. The demand for spot metal in small quantities has been met with a quotation of 6 cents, although until yesterday one has been able to secure only small quantities. Futures have been in fair demand. The market may be regarded as closing to-day with spot metal at 5.75 to 5.85, supplies having reached this market during the past 48 hours. Delivery from the West within a fortnight is to be had again and quoted as spot metal. October delivery closed at 5.70 and November at 5.65, with the market easier than it has been during the past three months.

ZINC SMELTER CHANGES.

Braun Smelter Changes Hands—New Smelter at Caney.

Iola, Kan., Oct 3.—It is definitely known here that the little group of capitalists who last week inspected the Braun Smelting Company's new plant at La Harpe have purchased the property, which will therefore be under control of the same interests which have controlled and operated the American Zinc, Lead and Smelting Company, of Joplin. Included in the party were Messrs. Coolidge, Clark and Kimball, of Boston, Mass.; C. H. Hacknev, of Carthage, and C. E. Hart, resident manager of the American Z., L. and S. Company, of Joplin. Mr. Walter Renton Ingalls, of Boston, who is one of the best posted

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If You Want to Keep Posted on Lead and Zinc Developments..... either in the mines, the ore markets or their allied industries, you want THE LEAD AND ZINC NEWS. Every other week, (26 issues), for $ .00. Send in your subscription.

writers in the country on zinc, accompanied the party as consulting engineer and metallurgist.

Announcement is made at Caney, Kansas, that Wm Lanyon, manager of the United Zinc and Chemical Works, of Iola, is to erect a four-block smelter at Caney. A site has been purchased and it is claimed that work is to be inaugurated during the next 30 days.

C. V Petraeus, who has been connected with the Lanyon Zinc Company as consultant metallurgist, has severed his connection with that company and is now in St Louis, whore he is to be connected with a new smelting enterprise.

Prof. Grimsley, of the State university, has recently been in this district in the interests of the Kansas exhibits of minerals and mineral products for the St. Louis exposition. Among the displays which will be sent from this locality will be one by the Lanyon Zinc Company, which proposes to show zinc ores, spelter, zinc sheets and rods. He reports that southeastern Kansas—the Galena district—is to make an excellent exhibit of zinc and lead ores

Prices of Sheets.

Regular net prices of black and galvanized sheets, subject to extras for odd sizes, and based on 2 75c for black and 3 85c for galvanized, No. 28 gauge. The net prices on galvanized represent 75 and 10 off list for 27 and 28 gauge, and a shade heavier discount for all other gauges except 29, the regular list on galvanized is appended:

Gauge.	Black Net.	Galvanized. Net.	Galvanized List
30	3.00	4.50	21
29	2.90	4 35	19
28	2.75	3.85	17
27	2 65	3 60	16
25-6	2.55	3 35	15
22-4	2.45	3 10	14
18-20	2.35	2.85	13
16	2.25	2 60	12
10-14	2 15		

The above prices are based on delivery at mill, Pittsburg district, plus regular tariff rate of freight to destination.

Meet in St. Louis Next Week.

The sixteenth annual meeting of the National Paint, Oil and Varnish Association will be held in St. Louis next week, the organization's headquarters being at the Southern Hotel. The association will hear a number of important reports and an excellent attendance is anticipated.

Brass Manufacturers Have Found

that our "Brass Special" brand of spelter will meet all of their requirements. It is made for the best selected virgin ores from the Joplin district and distilled with all care and attention possible.

Lanyon Zinc Company,

220 BROADWAY, NEW YORK. ST. LOUIS.

Address all orders for Spelter to St. Louis Office.

New Smelting Plant.

Florence, Colo., Oct. 3.—The United States Reduction and Refining Company has loaded eight cars with machinery and lumber for shipment to Utah, where the material will be used in the construction of a 5,000-ton smelting plant. This company recently bought the Delamar-Wall group of copper claims for $500,000. The ore is a low grade composition, but will net a profit if treated on the ground.

Mining Stock Quotations.

Following were the closing quotations on the lead and zinc stocks traded in on the local exchange and curb during the fortnight ending Oct 3, 1903:

Mining Stocks	Capital	Par	Quotations	
Catherine Lead Co. . .	800,000	10	.. .	2 25
*Central Lead Co . .	1 000 000	100	. .	....
†Cantor Creek M Co...	1,000,000	10	1.00	1 75
Columbia Lead Co.	800,000	10	. .	3 50
*Doe Run Lead Co . ..	1 500,000	100	..	115
Granby M & S Co . .	1 000 000	100	85	87
Granite Bi-Metallic ..	10,000,000	10	0 40	0 50
Hugo Mining Co	1 000 000	20	....	0 50
Small Hope M Co . .	5 000 000	20	0 15	.
‡St. Joseph Lead Co .	6,000 000	10	. ..	17
St Louis & Laura S Zinc Co	300 000	1	....	.
§Thanksgiving Lead & Zinc Co.....	50.000	5	....	3 00

*Last dividend, September, 1902, ½ per cent monthly

†Last dividend, July 1903 10 cents per share

‡Last dividend, September, 1903, ¼ per cent, quarterly

§Last dividend, September, 1903, 10 cents per share

Lead and Spelter Functuations.

Month.	Lead 1902	Lead 1902	Spelter 1903.	Spelter 1902.
January	4 075	4.000	4 865	4 27
February	4 075	4 015	5 043	4 15
March	4 442	4 075	5 249	4.38
April	4 567	4 075	5 550	4 37
May	4 325	4 075	5 629	4 47
June . .	4 210	4 075	5 687	4 96
July	4 075	4 075	5 662	5.27
August	4 075	4 075	5 725	5 44
September	.	4 075	. .	5.40
October		4 075	.....	5.10
November		4 075	.....	5.10
December		4 015	.....	4 70
Year		4 069	.....	4.84
		4 069		4 84

NOTE—The average price of spelter in St. Louis for the month of January, 1903 was 4 885c per lb; February 4 861c; March, 5 174c April, $4 375c; May, $5.458c; June, $5 537c, July, 5 507c, August, 5 85c.

Pennsylvania Smelting Co.

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Codes used: Bedford, McNeill, Moreing & Neal and Lieber's Standard Code.

Five Years' Spelter Averages.

The average monthly prices of spelter during recent years have been as below:

Month	1903.	1902	1901	1900	1899
January . .	4 87	4 325	4 09	4 60	5 40
February	5 025	4 18	3 975	4 675	5 20
March	5 045	4 315	3 915	4 625	5 35
April . ..	5 55	4 425	3 97	4 685	5 675
May . .	5 63	4 52	3 98	4 52	5 875
June	5 697	4 875	3 97	4 20	6 40
July	6.662	5 24	3 925	4 25	6 20
August	5.725	5 45	3 95	4 17	5 70
September		5 49	4 03	4 10	5 525
October		5 49	4 25	4.12	5 27
November		5 50	4 32	4.24	4.625
December		4 91	4 40	4.35	4 60

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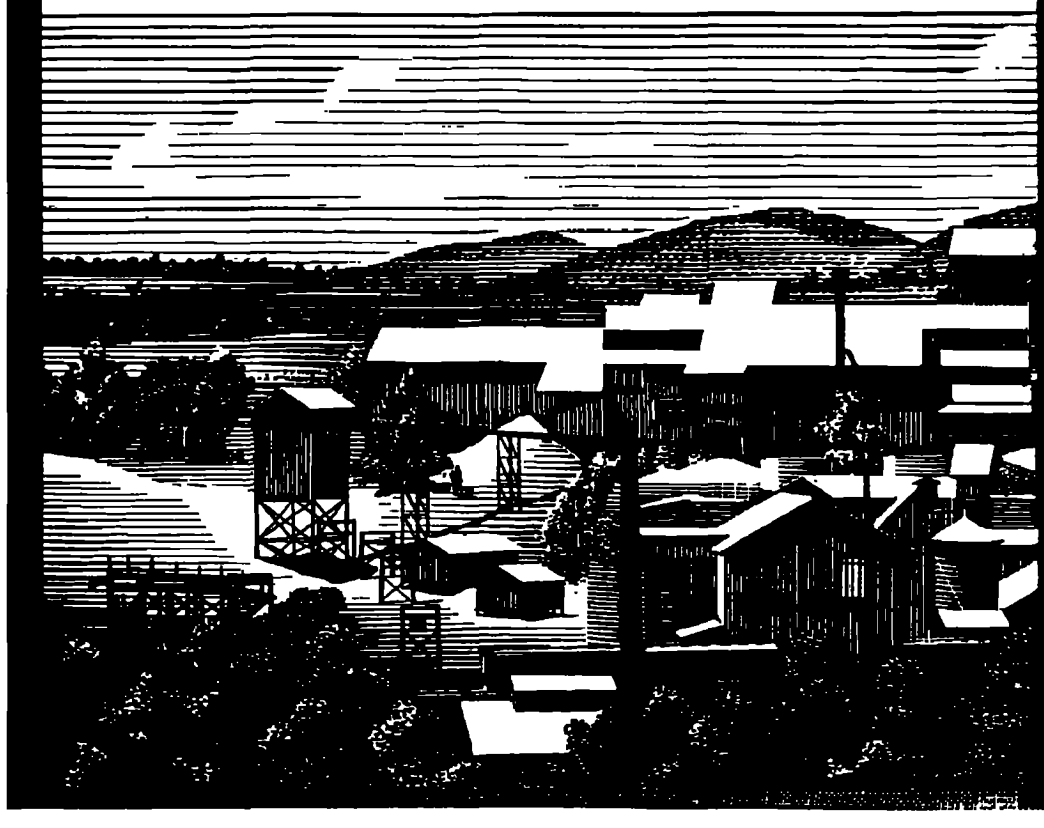
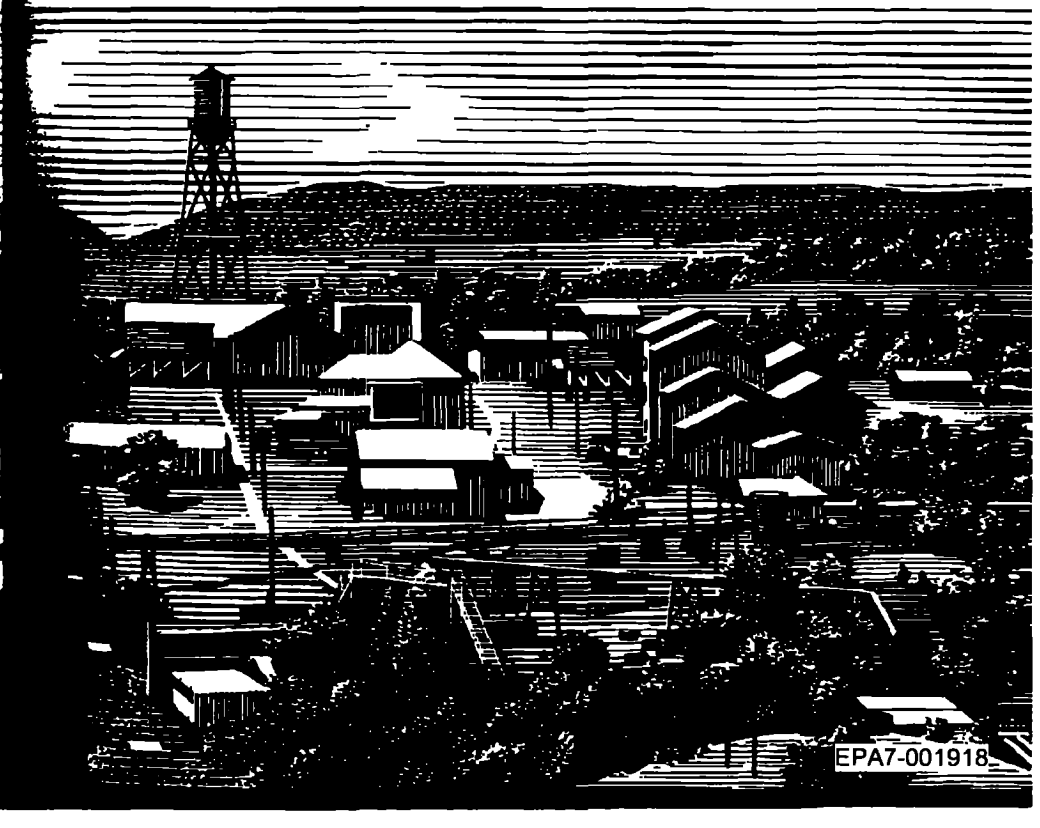
AZn

A HISTORY OF THE
AMERICAN ZINC COMPANY

BY JAMES D. NORRIS

STATE HISTORICAL SOCIETY OF WISCONSIN : MADISON : 1968





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ore, sized larger than the openings in the bottom of the tray, was spread in the tray. The up-and-down motion of the tray resulted in vertical segregation with the heavier mineral working towards the bottom and the barren rock moving to the top. After shoveling off the layer of barren rock the upgraded mineral could be recovered. The basic principle of the hand jig developed into the belt-driven Hancock jig and the still-used Cooley and diaphragm-type jigs.[9]

The jig greatly increased the efficiency of mineral beneficiation in the Joplin district, but it was not very successful in recovering ore sizes below an eighth of an inch. The development of the "sludge table," which also separated different minerals by means of differences in their specific gravity, helped to solve this problem. The sludge table resembled a slightly tilted table top with thin strips of wood called "riffles" nailed to its surface. An eccentric attached to the table imparted a reciprocating motion in the horizontal plane to the table, with the return movement being much faster than the forward motion. The ore, carried over the table by running water, settled into the depressions between the riffles. The quick return stroke tended to throw the heaviest material the farthest and eventually separated the ore into several bands of near-equal specific gravity which the motion and water drew off the end of the table into bins. By the time Kimball arrived in the Joplin district in late 1902 most of these improvements had been widely adopted and were considered standard operating procedure.

The company property in the Joplin area which Kimball inspected, and on which he based his report for future prospects, consisted of a small stone office in Cartersville and about 4,000 acres of land of which 2,300 acres were owned in fee simple and 1,700 acres were leased. Local miners operated leases on a small portion of mineral land, mining the small, but rich, "lens" deposits of zinc. Most of the land, however, was inactive. The largest and most promising tract, known locally as the Davey farm, consisted of 625 acres of leased mineral land located in a section of the district where mining from shallow shafts had been carried on for years. By 1902 these small-scale mines had

mostly closed down and there seemed little prospect of securing new sublessees. Nevertheless, when Kimball returned to Boston in January, 1903, he submitted a report recommending continued operations. The potential of the zinc industry attracted Kimball and apparently he convinced the board that a well-managed and closely integrated company, engaged in subleasing and mining the Joplin zinc deposits and in smelting, could enjoy substantial profits.[10]

There seems little doubt that Kimball pointed out to the board that the price of zinc metal did not fluctuate as violently as the market for zinc ore, and that the smelters seemed less subject to the intense competition that plagued the miners. In addition, a trained observer such as Kimball would have quickly discovered that smelters appeared more prosperous and better able to plan effectively for the future than miners. Kimball might have pointed out that the Granby Company, one of the most successful large corporations engaged in subleasing in the district, had already entered the smelting business. The exploitation of the natural gas deposits in southeastern Kansas had already encouraged the development of gas-fired zinc smelters in that region.

Apparently Kimball's enthusiasm proved contagious, for in April, 1903, the board hired Walter R. Ingalls, one of the foremost experts in the United States on zinc mining, smelting, and marketing, to serve as a consultant. Ingalls and Kimball agreed that the best procedure would be to purchase an already operating smelter in the district. Throughout the summer of 1903 Kimball and Ingalls inspected and negotiated for the acquisition of various smelters in the Kansas natural gas region. In October, 1903, Kimball, Ingalls, Clark, Coolidge, and C. H. Hackney, attorney at Carthage, Missouri, inspected the Braun Smelting Company's new plant at La Harpe, Kansas; they were accompanied by C. E. Hart, who had replaced W. B. Fisher as resident manager for American Zinc in Joplin. Before Kimball returned to Boston, he completed the deal.[11]

While Kimball pressed the board to invest more capital in vertical integration of company activities, Hart sought permission to engage in actual mining operations. As early as 1901,

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Hart's predecessor suggested to the board that many heretofore unprofitable properties could and should be operated by American Zinc at a comfortable margin. Indeed, when the board, remembering the previous costly experience under Renfrow, refused Fisher permission to operate the Marguerite lease for the company, Fisher managed the property under his own name and demonstrated the soundness of his proposal by turning over to the company more than $1,000 in profits the first year.[12] Despite Fisher's rather dramatic evidence, Clark and Coolidge refused to allow American Zinc to re-enter actual mining.

In June, 1903, Hart informed the board that the Three Shaft Mining Company, sublessee of part of American Zinc's Davey property, would abandon its unprofitable small-scale mining operation. The directors skeptically granted Hart's request to prospect the claim scientifically to determine the economic feasibility of a larger-scale operation. Hart argued that poor management and bad mining techniques, not exhausted mineral deposits, had caused Three Shaft Mining Company's failure, and that detailed cost studies would prove that the property could be profitably mined. The board granted his request to undertake the study.[13]

Hart's argument and cost studies persuaded the board that hard-rock mining, unlike the previous soft-ground diggings, could be more profitable carried on by large-scale operations. American Zinc spent over $2,000 per month during the latter part of 1903 and early 1904 drilling other properties to test ore values and tonnages. The results exceeded even the most optimistic predictions; of the twenty-three holes drilled on the Hockaday tract, for example, ore was found in all but two. Moreover, the ore, encountered at the 157-foot level, ran about eighteen feet of uniform thickness and quality. Development of this property and the purchase of the already operating Richmond mine in the Webb City-Cartersville section of the Joplin district provided a firm basis for American Zinc's re-entry into mining and milling for its own account.[14]

Harry Kimball argued that the Davey farm, which American Zinc first leased and finally purchased at Hart's and Kimball's

insistence, offered unusual opportunities for profitable operations. Kimball urged the board to allow him to apply to the Davey property the large-scale, low-unit-cost methods, which Hart was already successfully using, in an effort to expand production rapidly and take advantage of rising ore and metal prices.[15] On the Davey property drilling indicated a large tonnage of ore deposited in solid rock often more than twenty-five feet thick. Unfortunately, the ore was of a lower grade than had ever been commercially mined in the Joplin area. Nevertheless, Kimball believed that by employing large-scale operations with the resulting economies of scale, and by carefully reducing costs in mining and milling, a production level of at least 600 tons of ore per day would prove profitable even under existing ore prices. Moreover, the trend within the industry indicated higher ore and spelter prices in the near future.[16]

With Coolidge's strong personal recommendation and at Kimball's insistence, the board agreed to cost studies for the necessary equipment for large-scale production at Davey to materially reduce mining and milling costs. Kimball's estimates amounted to $30,000 for the installation of standardized Joplin machinery and power units, which had already proven economical in the district, in addition to materials and equipment on hand. The board, still remembering American Zinc's first disastrous experience in operating mines and mills under general manager Renfrow, finally approved Kimball's request for $30,000, with a warning that "those estimates had better be right or else." The overly optimistic Kimball found himself $5,000 short, and his urgent request to the board for additional funds was returned with a reply that the company had no money to provide. Faced with the absolute necessity for more capital, Coolidge, with the agreement of the board, personally advanced the $5,000 needed to complete the plant.[17]

Even Kimball's optimistic predictions proved too conservative. In 1905, from the Hockaday and Davey tracts alone, American Zinc produced $146,850.69 in lead and zinc concentrates. From an ore with a recoverable value of only $1.27 a ton and at approximately $0.87 per ton operating costs, Kimball reported a

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profit of nearly $76,000 for the year.[18] The following year the total value of the company's production exceeded $495,000. American Zinc was in the mining business to stay.[19]

In 1906 Kimball re-established his headquarters at Boston and named Charles W. Landrum, who had been with the company for several years, manager of mines. Landrum's appointment illustrated Kimball's ability to attract talented people. The Missouri Mine Inspector in 1907 noted of Landrum:

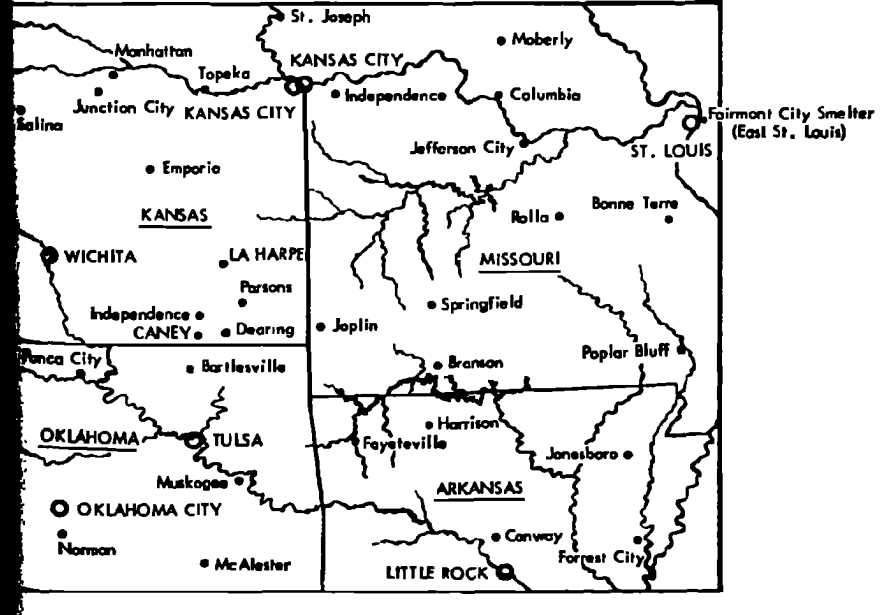
> Under his supervision the work of mining and milling the ore has been so systematized that the smallest detail relating to the cost of mining the several grades of ore, the cost of fuel and milling, can each be determined for each day that operations are carried on. . . . The cost of the respective fuels per horse power, per day, has been arrived at and correctly determined. . . . With the splendid equipment and management of this company, with two per cent zinc ore, the same selling at $40 per ton, has furnished a profit. Facilities for economically mining, handling and milling such grade ore has much to do with the result.[20]

The introduction of accurate cost accounting, a new technique in the Tri-State area, (Missouri, Kansas, and Oklahoma) permitted Landrum and Kimball to conduct carefully controlled experiments in developing low-unit-cost mining methods and machinery for handling the low-grade ore in the "sheet ground." In 1907, to increase production and lower labor costs, American Zinc introduced in the Joplin mines, the first steam-operated shoveling machines especially adapted for underground work. That same year, at Albert Holden's suggestion and Kimball's specific instruction, Landrum began using mules underground to replace hand labor in pulling the ore cans from the "mining face" to the hoist.[21] All of these innovations in mining techniques increased productivity and lowered costs.

In milling Kimball adopted the usual Joplin practice of building small individual concentrating plants near the hoisting shafts, rather than the large central mills employed in many other mining camps. By 1905, out of years of adaptation and experimentation, a definite system of ore concentration had evolved—

nationally recognized as "Joplin Mill practice."[22] Once a deposit was exhausted the light and portable Joplin mill could be dismantled and moved to a new location. These mills proved quite flexible in operation and size, depending entirely on the estimated tonnage output. In practice the 500- to 1,000-ton-a-day capacity mills quickly dominated the district. Once the ore had been crushed to the proper one-half-inch size or less, it flowed through a series of jigs by means of pulsating water.[23] The heavier mineralized particles settled faster and the lighter waste washed off as "chats" or "tailings."[24] The product of the jig process was a fine sand containing mineral particles called "middlings." A "cleaner jig" separated these fine ore particles from waste sand, the end product being a concentrate of approximately 60 per cent zinc content.[25]

In the early period the zinc concentrates were shipped to the smelter by wagons and later by narrow-gauge tracks connecting the



TRI-STATE ZINC DISTRICT

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mills to railroads. Until the 1920's most zinc in the United States was produced in horizontal retort furnaces. Unlike most other common metals, which are smelted in large furnaces and the metal drawn off in the molten state from the bottom, zinc is actually distilled or vaporized and the metallic vapor subsequently condensed. In the distillation, or "retort," process concentrates are first roasted in order to burn off the sulphur and convert the zinc into an oxide. The roasted concentrates, or "calcine," after being mixed with finely ground coal, are "charged" into cylindrical, burnt-clay containers called "retorts," with a capacity of about one and three-fourths cubic feet each. Retorts are arranged in long horizontal rows in a gas-fired furnace. Inside the cylindrical retort the carbon in the coal unites with the oxygen in the zinc oxide, liberating the metallic zinc at a temperature above its boiling point. The zinc vapor condenses in a funnel-shaped clay condenser where it is periodically drawn off as a liquid and cast into slabs of approximately fifty pounds.[26]

After each twenty-four-hour cycle the retorts are cleaned of the residues, recharged with fresh material, and replaced in the furnace. The labor involved in early horizontal retort furnaces required about 2¼ highly skilled man-days per ton. Besides the raw concentrates, the large fuel requirements presented the most costly expenditure. In 1899 smelting costs averaged between $10 and $12 per ton of ore, with only about 82 per cent of the zinc content extracted. Inauguration of natural gas smelting in the Tri-State area reduced smelting costs $3 to $5 per ton and increased the extraction rate to 85 or 86 per cent.[27] The essential requirements for profitable and dependable zinc production included cheap fuel, trained labor, and an abundant supply of high-quality concentrates.

Until after World War I, American Zinc, like most zinc producers, sold most of its metal through specialized marketing firms on a commission basis. Occasionally large consumers of zinc metal, such as steel firms which used large quantities of zinc in galvanizing, contracted with American Zinc for delivery of metal in the future at a set price. Increasingly during the 1920's, and especially after Howard I. Young became president in 1930, American

Zinc handled its own sales through regional offices and a sales force which worked on a straight salary basis. While the establishment of a separate sales department allowed for a more aggressive effort in seeking customers, it is probable that in the early years the use of commission firms was more economical.

By operating its own mines, mills, and smelters, American Zinc, Lead and Smelting joined Granby Mining and Smelting and New Jersey Zinc as the only fully integrated zinc firms in the United States.[28] Other smelters in the Tri-State area purchased concentrates in the sharply fluctuating Joplin market, where price variations made smelting unduly risky. Walter R. Ingalls, a leading authority on the zinc industry in the United States, noted about the period between the turn of the century and World War I that "The producers of ore were counted by hundreds, most of them being individually small, and the industry was quite unorganized, both on the mining and the smelting sides, strongly competitive on both sides, and not very profitable as a whole."[29]

Despite the advantages of fully integrated operations, increased fuel costs and the possibility of gas shortages convinced Kimball that in the long run the La Harpe smelter was not a desirable property. On December 30, 1905, the board of directors accepted Kimball's recommendation to sell the smelter at about the same price as the original cost, and American Zinc temporarily retired from the smelting business. Nevertheless, the experience had been profitable and Kimball remained convinced that a fully integrated mining, milling, and smelting company stood the best chance of earning consistent profits in the zinc industry[30]

As the price of spelter rose during 1906, and especially as the smelting margin—that is, the difference between the prices of ore and of spelter—increased, Clark, Coolidge, and Kimball sought a sounder financial position for prospective expansion. In a letter to stockholders of October 8, 1906, Kimball pointed out that although the company had reinvested the $120,000 net profits from the previous year's operations, there was still a shortage of operating capital, $110,000 of debt, and a need for an additional

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$100,000 for immediate development. Moreover, the requirement in the bylaws that authorized but unissued stock not be sold for less than par value of $25 per share prevented the directors from raising the necessary funds in this manner, since the market value of American Zinc stock had not reached $25 for some time.

The directors proposed reducing the number of authorized shares by half, from 100,000 to 50,000, thereby decreasing the total capitalization to $1,250,000. Under this scheme each shareholder would have the same proportional interest in the company, and would have the opportunity to purchase his *pro rata* share of the 10,000 shares being offered at $25 par value to raise a necessary quarter million dollars for operating capital. In the event stockholders failed to take the entire offering, a syndicate of the directors agreed to underwrite the issue without commission.[31] The approval of this proposal on October 16, 1906, provided the necessary capital for expansion and vastly improved the immediate financial position of American Zinc. Perhaps even more important, the newly reduced capitalization represented a much more realistic evaluation of assets and potential earning power.

Less than a year after disposing of the La Harpe plant, Kimball had an opportunity to acquire substantial interests in two newly constructed smelters in southeastern Kansas. Ludwig Vogelstein, president of a New York metal brokerage firm and manager of International Metals Selling Company, an affiliate of United States Smelting, Refining, and Mining Company, had acquired options on smelters at Caney and Dearing, Kansas, together with ample gas properties to ensure plentiful low-cost fuel. Vogelstein knew—through his contacts with Clark and Coolidge, who served on the board of United States Smelting, Refining and Mining, and with Albert Holden, who was then managing director of United States Smelting, Refining and Mining—that Kimball desired to re-enter the smelting business. Vogelstein offered to sell the smelters for a total purchase price of approximately $1,000,000. Kimball suggested buying the smelters by issuing 40,000 additional shares of stock, buying a half interest outright, and trading 20,000 shares of fully paid-up stock to L.

Vogelstein and Company for the remaining interest. To secure the two smelters the stockholders of American Zinc agreed to increase the authorized capital stock to 150,000 shares; 80,000 shares were outstanding and 70,000 additional shares were authorized but unissued, making a total capitalization of $3,750,000. The shareholders increased the number of directors from seven to eleven to allow L. Vogelstein and Company proportional representation.[32]

The purchase of the smelters, while allowing the vertical integration which Kimball desired, unfortunately also forced American Zinc to permit Vogelstein a voice in policy decisions. The metal brokers, concerned more with speculative profits from market fluctuations than in long-range profits, often advocated policies which Kimball considered contrary to the interests of the company. Also, as part of the bargain, American Zinc entered into a disadvantageous marketing contract with Vogelstein which restricted Kimball's alternative courses of action. The agreement lasted until immediately prior to World War I. A third consequence of the connection with Vogelstein and Company was the development of a schism within the theretofore close-knit board of directors. The previous board consisted of close friends and even neighbors who by 1906 had given up the dream of quick speculative profits and were more concerned about the long-range future of their investment. The Vogelstein element within the board proved disruptive until its replacement during World War I.[33]

The smelter at Caney was already in operation at the time of the transaction and the Dearing plant was in the final stages of construction. *The Mineral Resources of the United States for 1906* announced: "In March, 1907, two blocks of the new plant at Dearing, Kansas were fired up, and at present all four blocks of 600 retorts each are in full operation."[34] The two plants together produced about 30,000 tons of spelter a year and from January, 1907, to the end of November, 1910, yielded a total profit of $732,773.01.[35] Once again American Zinc enjoyed full integration of its Tri-State properties, a constant goal of Kimball to promote stability and hopefully profitable operations.

Having integrated production in the Tri-State area, Kimball

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named W. F. Rossman as manager of smelters, who, with C. W. Landrum as manager of mines, supervised American Zinc operations in the field. Kimball again returned to Boston. Even so, all decisions regarding policy were made or approved by Kimball. In addition the Boston members of the board, especially Coolidge and Clark, participated actively in the affairs of the company. Albert Holden and Vogelstein also took an unusually detailed interest in operations and policy decisions. "Policy," of course, implies some degree of control over events, and judgments as to the probable results of alternative decisions. In practice the dealer, buying and selling in an organized market such as zinc, exercises no real price "policy." Even a dealer who speculates on rises in the market, but sells through the medium of a quoted price, has no such policy[36]

As to labor and production, Kimball set forth American Zinc policy bluntly and succinctly in 1907:

> We are in favor of the premium basis of pay at this end, depending upon the amount of work actually done. . . . We do not believe in entering into any agreement with other smelters in regard to the question of wages. If we can afford to pay men more money than some other smelter can whose methods are not as modern and effective as ours, and whose costs are more than ours, we consider that that is not our fault. . . . We believe in running our own plant according to our own ideas without regard to our competitors.[37]

As Kimball went on to explain, he was not acting from altruistic motives; rather, "it all resolves into a matter of cost and keeping the plant running at full capacity. Our loss from one week deadfire would be so great that any reasonable increase in wages would be as nothing to it."[38]

In the same manner, American Zinc's pioneering safety measures, particularly the introduction of the water-hammer drill and other dust-abatement practices, while partly motivated by the humanitarian desire to prevent accidents and silicosis, stemmed equally from Kimball's concern to lower the costs of the state-required accident and disability insurance.

On the question of ore purchases, Kimball suggested that Rossman continue the policy of buying Joplin ores at market quotations even though he predicted lower spelter prices. If ore fell in equal ratio, there would be no reduction in the smelting margin. Reasoning that their own gas wells supplied fuel at practically no cost, Kimball urged Rossman to maintain at least a four to six weeks' supply of ore on hand to ensure steady production (unless he anticipated a sudden drop in Joplin ore prices). Kimball preferred Joplin concentrates to others because they were cleaner and easier to treat. Most of all, he reminded Rossman that low unit costs depended on economies of scale which came from operating at full capacity.[39]

In early 1907 spelter prices started to slump. Whereas zinc metal averaged 6.10 cents per pound in 1906, the 1907 price averaged only 5.90 cents and the following year dropped to 4.62 cents per pound.[40] As usual, ore prices declined, but not so fast as the metal prices, so that the smelting margin narrowed to where profitable smelting became almost impossible. However, within a few months ore prices began a corresponding decline; in September, 1907, some analysts argued that the market price of ore had fallen below the actual costs of mining and milling. An agreement to restrict ore production provided temporary relief, but as a leading mining journal noted, "it was of course ineffectual in combating the great industrial depression that was pending."[41]

Harry Kimball, disgusted at the fluctuating prices of ore and metal, remarked, "The whole zinc business has been a game of children from the beginning."[42] Since most smelters sold a major portion of their output for future delivery, the price at which they purchased ore often had more bearing on profits than efficient, low-cost methods and techniques. Moreover, the market remained beyond the control of the managers. For several years American Zinc, Lead and Smelting Company had tried to inaugurate a system of buying concentrates on a contract basis with a fixed relation between the price of metal and ore. Unfortunately, as Kimball pointed out, this was contrary to the entire history of the district, and a sliding scale for ore on a contract basis was not successfully introduced until 1911, and was not generally accepted until after World War I.[43]

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Faced with rapidly falling ore prices, in December, 1907, the directors of American Zinc ordered all mining operations closed down and suggested running 50 per cent of the smelter capacity on "dead heat."[44] Ore purchases were to be restricted to the absolute minimum necessary to fulfill existing metal contracts. Both Kimball and W. F. Rosman blamed their troubles on the exclusive selling contract with L. Vogelstein and Company. "If you and I were running the selling end," Kimball agreed with Rossman, "I believe we would at least make a greater effort to sell metal than appears to have been done."[45] When Coolidge and Clark suggested completely closing the Caney smelter, Kimball balked, arguing it would be better to operate at a small loss so long as the variable costs and any part of the fixed costs were covered than to operate on "dead heat" with fixed expenses of over $1,000 per month, not counting vacant company houses, empty buildings, loss of skilled labor, and damage from neglect.[46]

The panic and general business depression in 1908 produced severe but short-lived reactions in the zinc industry. The price of spelter dropped first, placing a strain on the smelters, who in turn began lowering the price they would pay for ore. In mid-July, 1908, Kimball argued that the crisis had passed, and operations resumed in the mines. A month later he advised Rossman to maintain minimum purchases of concentrates and to wait for the increased production of ore to force prices lower before increasing the reserve stock.[47]

With the price of ore and metal fluctuating independently on a weekly and even a daily basis, the operation of zinc smelters assumed a speculative character which made long-range planning senseless. The barrage of letters, coded telegrams, and phone calls from Coolidge, Clark, and Vogelstein to Kimball, and from Kimball to Rossman, advising market conditions and suggesting when and at what price to enter the ore market, consumed more time than normal operational communications. Partly in an effort to remedy this situation, and particularly to eliminate the cutthroat competition for concentrates among smelters in the Joplin district and to "stabilize" prices, A. B. Cockerill, president of Cockerill Zinc Company, proposed a smelter's combine to establish quotas and limit prices for ore in the district.[48] In

September, 1908, the proposed smelter combine held an informal meeting in St. Louis. Kimball, mindful of the recent panic, requested permission to attend. Coolidge immediately gave a negative reply, saying, "You will conduct your affairs regardless of others."[49] Although both Cockerill and L. Vogelstein argued that the combination was not intended as an illegal restraint of trade, Coolidge informed Kimball this was "foolish" in view of the announced intention of holding ore prices at $36 per ton.[50]

Even though the proposed combination exerted little or no influence in its efforts to control the Joplin ore market, both Kimball and Rossman, anxious to eliminate what they considered unnecessary risks and uncertainties in the zinc industry, urged Coolidge to allow them to attend the meeting. On October 30, 1908, under Coolidge's stern admonishment, the board of directors passed a resolution that "no officers, directors, agent or representative of this company shall represent this company or its directors at any meeting or conference held for the purpose of fixing either directly or indirectly the production or price either of ore or spelter."[51] In spite of American Zinc's refusal to become involved, Cockerill continued to keep Rossman advised on the organization's haphazard attempts to control the market and to urge both Rossman and Kimball to attend meetings. In October, 1911, three years after the original proposal, responding to Kimball's persistent argument that such an organization, by eliminating speculation and ending waste, would benefit American Zinc and the entire industry, Coolidge again vetoed the idea. While Coolidge admitted that he personally did not agree with the antitrust laws of Missouri and the United States, in his view they must be obeyed. When Kimball complained about the vagueness of the laws, Coolidge willingly acknowledged that he could not swear that the activities of the zinc combine constituted a violation, but nevertheless: "There is only one thing *I am sure of*. We are trying to run a legitimate business of mining zinc ore, and also in smelting that ore, and other ore we may buy, by means of gas. I know that we are not attempting to interefere with any other man's business. All we are trying to do is conduct a reasonable and legitimate business in a businesslike way."[52]

Coolidge's advice to Kimball to forget about combinations and

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CHAPTER 2

[1] Interview with Richard Immel, August 17, 1963.

[2] Interview with C. T. Millice, February 2–3, 1959; Harry Kimball, "American Zinc, Lead and Smelting Company 1903 to 1916, Inclusive," 1. When Kimball resigned as president in 1916 to accept the presidency of Remington Arms Company, he was asked to write a sketch of his experiences with the American Zinc Company. This eight-page unpublished essay is hereafter referred to as Kimball, "American Zinc."

[3] Interview with H. A. Coy, August 18, 1963.

[4] *Ibid.* See Edward C. Kirkland, *Dream and Thought in the Business Community, 1860–1900* (Ithaca, 1956), for an analysis of the businessman's thought toward the outside world. Kimball's impulsiveness and optimism eventually proved to be his undoing. In 1916 he left American Zinc to assume the presidency of the Remington Arms Corporations. After a few years he resigned, went into business for himself, and was bankrupted during the 1929 crash. He died in 1936 while living in California on a very modest income.

[5] Kimball, "American Zinc," 1.

[6] *Ibid.*, 2; and Missouri Bureau of Mines, *Eighteenth Annual Report* (Jefferson City, 1904), 147–148.

[7] For the description of early mining practices in the Joplin district I am indebted to W. F. Netzebrand, a long-time resident and student of the Tri-State mining area, and to Arrell M. Gibson, "A History of the Lead and Zinc Industry of the Tri-State District" (unpublished Ph.D. dissertation, University of Oklahoma, 1954).

[8] "Dewatering" is commonly used in mining terminology rather than "draining."

[9] See Gibson, "A History of the Lead and Zinc Industry of the Tri-State District," for a more detailed discussion of the jig

[10] Kimball, "American Zinc," 2–3; A.Z.L.S., Minutes of the Board of Directors, January 21 and April 22, 1903 Unfortunately no copy of Kimball's report exists, and indeed he may only have submitted an oral report to the board. The substance of the report must be inferred from Kimball's subsequent actions and later recollections.

[11] *Ibid.*; "Spelter Market Easier," *Lead and Zinc News*, 6 211 (October 5, 1903). For a discussion of the locational factors in zinc smelters, see Carl K. Cotterill, *Industrial Plant Location and Its Application to Zinc Smelting* (St. Louis, 1950).

[12] William B. Fisher to R. E. Paine, April 13, 1901, A.Z.L.S. Archives, Joplin, Missouri.

[13] A.Z.L.S., Minutes of the Board of Directors, June 2, 1903.

[14] *Joplin Daily Globe*, January 31, 1904. Drilling was and is used extensively in mine exploration to determine the size, shape, and character of possible ore bodies.

[15] Missouri Bureau of Mines, *Eighteenth Annual Report.*

[16] Kimball, "American Zinc," 2.

[17] *Ibid.*, 2–3.

[18] *Ibid.*, 3; Missouri Bureau of Mines, *Nineteenth Annual Report* (Jefferson City, 1905), 350–351.

[19] Missouri Bureau of Mines, *Twentieth Annual Report for the Year Ending December 31, 1906* (Jefferson City, n.d.), 8–9.

[20] *Ibid.*

[21] Harry Kimball to C. W. Landrum, April 4, 1907, A.Z.L.S. Archives, Mascot, Tennessee. In mining terminology "mining face," as applied to the underground drift, crosscut, or slope, is the end in which work is progressing.

[22] "Joplin Mill Practice," *Engineering and Mining Journal*, 78: 579–580 (October 13, 1904); Gibson, "A History of the Lead and Zinc industry of the Tri-State District," 152–155

[23] *Ibid.*; Northern Mining Press, *Mining Explained in Simple Terms* (Toronto, Canada, 1955), 150.

[24] "Joplin Mill Practice," *Engineering and Mining Journal*, 78: 580–582.

[25] Julian D. Conover, "The Zinc Industry," in John G. Glover and William B. Cornell (eds.), *The Development of American Industries* (New York, 1932), 407–408.

[26] *Ibid.*, 409–410. Producer gas is prepared by burning low-grade coal in a limited air supply so that a combustible gaseous mixture is obtained.

[27] *Ibid.*, 440; Ingalls, "The Zinc Industry," in Warshow (ed.), *Representative Industries*, 664–665.

[28] *Ibid.*, 660, and H. D Carus, "Historical Background," in C. H. Mathewson (ed.), *Zinc: The Science and Technology of the Metal, Its Alloys and Compounds* (New York, 1959), 1–7.

[29] Ingalls, "The Zinc Industry," in Warshow (ed.), *Representative Industries*, 660.

[30] A.Z.L.S., Minutes of the Board of Directors, December 30, 1905; and Letter to Stockholders, December 11, 1906.

[31] A.Z.L.S., Letter to Stockholders, October 8, 1906.

[32] *Ibid.*, December 11, 1906.

[33] Kimball, "American Zinc," 6; and interview with C. T. Millice, February 2–3, 1959; A.Z.L.S., Minutes of the Board of Directors, October 16, 1907.

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DOCUMENT INFO

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Filename: La Harpe Smelting Corporate Filings KS.pdf

DOCUMENT INFO

Dissolved

Mar. 7, 1910

Name LaHarpe Smelting Co.

Address Wyoming

Received Oct 6 1906

Approved 190

Rejected 190

FEES PAID.

Application Fee,	Oct	6	25	
Filing and Rec. Fee,	Oct	6	2	50
Charter Fee,	Oct	6	220	
Total,			247	50

L-1 Capital Stock, $ 220 000.00

REQUIREMENTS.

#60.00 over Cert Copy charter

Filed

Notified of requirements,

Oct 17 1906

By

(1684)

EPA7-001927

CAMPBELL & GOSHORN,
ATTORNEYS & COUNSELORS,
ALTES H CAMPBELL.
JOHN F GOSHORN.
STENOGRAPHER & NOTARY.
BANK ALLEN COUNTY BLDG.
IOLA, KANSAS.

Re La Harpe Smelting Co. Wyo. October 8, 1906.

Secretary of State,
Topeka, Kansas.

Dear Sir:

Herewith find certified copy of Articles of Incorporation of said company, for use of the Charter Board in passing upon said company's application for permission to engage in business in this state.

Yours truly,

enc.

6-02—960

Know all Men by these Presents:

That the LA HARPE SMELTING COMPANY

a corporation organized under the laws of the State of WYOMING, and with its principal office at CHEYENNE, in said State, hereby consents, without power of revocation, that actions may be commenced against it, the said LA HARPE SMELTING COMPANY, in the proper court of any county in the State of Kansas in which a cause of action against such corporation may arise, or may have heretofore arisen, or in which plaintiff may reside, by service of process on the Secretary of State of the State of Kansas; and the said corporation stipulates and agrees that such service shall be taken and held in all courts to be as valid and binding as if due service had been made upon the president or any other chief officer of said corporation.

IN WITNESS WHEREOF, Said corporation has caused these presents to be executed by its President and its Secretary, and authenticated by its corporate seal, at the city of Nevada in the State of Missouri, this 5th day of October, A. D. 190 6.

ATTEST: [signature] President.

[signature] Secretary.

EPA7-001929

RESOLUTION

BY

THE Board of Trustees of La Harpe Smelting Company, a corporation of the State of Wyoming.

October 190 6.

At a meeting of the ~~Directors~~ Trustees of La Harpe Smelting Company, duly held at the office of said Company, on the 24th day of February, 1906 Mr. Clark offered the following resolution and moved its adoption:

RESOLVED, That the President and Secretary of this company be and they are hereby authorized and instructed to execute the written consent thereof to be sued in the State of Kansas, in the manner provided in section 3 of an act of the Legislature of the State of Kansas concerning private corporations, approved January 7, 1899.

The resolution was adopted.

STATE OF Kansas ,
COUNTY OF Allen , } ss.

Walter S. Goodin,

being duly sworn, says he is Secretary of the La Harpe Smelting Company, a corporation of the State of Wyoming, and that the foregoing is a true and correct copy of a resolution adopted by the Board of ~~Directors~~ Trustees of said corporation held , on the 24th day of February, 190 6 together with the minutes concerning said resolution.

Walter S. Goodin Secretary.

SWORN TO AND SUBSCRIBED before me, this fifth day of October, 190 6.

Otis C Hestwood
Notary Public.

(My commission expires Aug 23 1910)

EPA7-001930

The State of Wyoming

OFFICE OF THE

SECRETARY OF STATE

United States of America, } ss.
State of Wyoming. }

I, Wm. R. Schnitger, Secretary of State, of the State of Wyoming, do hereby certify that the annexed has been carefully compared with the original Certificate of Dissolution of LA HARPE SMELTING COMPANY, filed in this office on the Fourth day of February, A. D. 1910, at nine o'clock, A. M., and is a full, true and correct copy of same, and of the whole thereof. .....

In Testimony Whereof, I have hereunto set my hand and affixed the Great Seal of the State of Wyoming.

Done at Cheyenne, the Capital,

this SECOND day of

MARCH, A. D. 1910.

Wm. R. Schnitger

Secretary of State.

By _____

Deputy.

EPA7-001931

Notice is hereby given that at a special meeting of the stockholders of La Harpe Smelting Company held at the offices of the company in Cheyonne, Wyoming, being the offices of Burke & Clark, attorneys, at 10 o'clock a.m., on the 20th day of December, 1909, notice of which meeting had been duly advertised according to law, and at which meeting all of the shares of capital stock of the company issued and outstanding were represented, by proxy duly authorized in writing, the said meeting having been called for the stated purpose of considering a proposition to dissolve the corporation, all of the debts of said corporation having been fully paid it was unanimously decided by said stockholders to dissolve the said corporation, and the said corporation was thereby dissolved.

A. B. Cockerill

Attest: W. S. Goodin
Secretary.

President.

(CORPORATE SEAL)

10/16-06 247.50

Foreign Corporation.

APPLICATION

OF THE

Las Harpe Smelting Company

OF

Wyoming

Filed this ... day of ... 190...

Secretary of the Charter Board.

Approved by Charter Board, this 17 day of Oct 190...

[signature]

Jno. L. Royce

State Charter Board.

W. T. MORGAN, STATE PRINTER.

Campbell & Goshorn

Iola

Received of J. R. BURROW, Secretary, $ 60.00 One Hundred Sixty and 00/100 Dollars, fee on this Charter.

OCT 17 1906

[signature]

State Treasurer.

by [signature]

Asst. State Treasurer.

EPA7-001933

Application for Authority to Engage in Business in the State of Kansas as a Foreign Corporation.

TO THE CHARTER BOARD OF THE STATE OF KANSAS:

The LA HARPE SMELTING COMPANY *, a corporation organized under the laws of the State of* WYOMING *, applies for permission to engage in business in the State of Kansas, and for that purpose submits the following statement, to wit:*

FIRST.

A certified copy of its Charter or Articles of Incorporation, which is filed herewith.

SECOND.

The place where the principal office or place of business of said corporation is to be located is at Iola Kansas ----------

THIRD.

The full nature and character of the business in which said corporation proposes to engage within the State of Kansas is to carry on a general manufacturing business, and in furtherance thereof to acquire, by purchase, lease, contract, donation, mining or otherwise, zinc and other ores, minerals, coal, stone, clay, shale, natural gas and oil and to reduce and refine the same, and to manufacture spelter and other products, articles and commodities therefrom, and to sell or otherwise dispose of the same; also to acquire, hold, own, possess, maintain and operate, by purchase, lease, donation, manufacture, construction, condemnation or otherwise, any and all such real, personal or mixed property including lands, plants, manufactories, works, work shops, mills, wells, quarries, pipe lines, pipes, equipment, apparatus, machinery, tools, electric or other power plants, mining rights, gas rights, oil rights, rights-of-way, franchises, licenses and priveleges as it may deem necessary or convenient for the carrying on of the aforesaid general manufacturing business.

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FOURTH.

The names and addresses of the officers and trustees or directors are:

Almond B. Cockerill	Nevada, Mo.
Walter S. Goodin,	Iola, Kansas.
George A. Nicholson,	Iola, Kansas.
John F. Goshorn,	Iola, Kansas.
Millard W. Teats,	Iola, Kansas.

FIFTH.

RESOURCES.	Dollars.	Cts.	LIABILITIES.	Dollars,	Cts.
Bills receivable,			Capital paid up,	$ 220,000.00	
Real estate,	110,000.00		Surplus,		
Personal property,	21,717.21		Undivided profits,		
Stocks, bonds, and other securities,			Bills payable,	60,523.16	
Merchandise,	27,201.74		Accounts payable,	47,975.20	
Cash on hand,	4,778.83		Bonded indebtedness,		
Due from banks,			Encumbrance on real estate or plant,		
Accounts receivable,	80,190.92				
Judgments,					
Gas-wells, Gas-lands, Leases	48,480.36				
Spelter	36,129.30				
TOTAL,	$328,498.36		TOTAL,	$328,498.36	

SIXTH.

The amount of the capital stock of said corporation is Two hundred and Twenty Thousand *Dollars, divided into* Twenty-two hundred *Shares, of* One Hundred *Dollars each.*

We further state that the above application is made in good faith, with the intention that said corporation shall actually engage in the business specified, and none other.

EPA7-001935

State of Kansas , } ss.
Allen County, }

I, A. B. Cockerill, President,
and I, Walter S. Goodin, Secretary,
of the above-named corporation, do solemnly swear that the above is a full and complete statement of the resources and liabilities of said corporation. as shown by the books of the same, and that said statement and the several matters and things contained in this application are true in every particular, to the best of my knowledge and belief. So help me God.

A. B. Cockerill, President.

Walter S. Goodin, Secretary.

Subscribed and Sworn to before me, this fifth day
[SEAL.] of October, A. D. 1906.

Ottis C. Westwood
Notary Public.

(My commission expires Aug 23 1910)

State of Kansas } ss
County of Allen }

I, Victor A. Smith, being first duly sworn on oath say, that I am Agent & Cashier of La Harpe Smelting Company, a corporation organized under the laws of the State of Wyoming, and that I am familiar with its real estate, plant, pipe lines, gas wells, gas lands, gas leases, spelter on hands, and all other property belonging to said corporation, and am familiar with the value thereof, and that the same is of the value of $328,498.36.

Victor A. Smith

Subscribed and sworn to before me this 5th day of October, 1906.

Flora E. Demming
Notary Public.

Commission expires Jan. 20. 1909

EPA7-001936

(2)

Certified Copy
of
Certificate of Incorporation

La Harpe Smelting Co
of
Utah

The State of Wyoming

- - Office of the - -

Secretary of State.

United States of America, }
State of Wyoming, } ss.

I, Fenimore Chatterton, Secretary of State, of the State of Wyoming, do hereby certify that the annexed copy of the Certificate of Incorporation of

... LA HARPE SMELTING COMPANY ...

has been carefully compared with the original, filed in this office on the TWENTY-FOURTH *day of* FEBRUARY *A. D.* 1906, *at* ten *o'clock* m., *and is a full, true and correct copy of the same and of the whole thereof.*

In Testimony Whereof, *I have hereunto set my hand and affixed the Great Seal, of the State of Wyoming.*

Done at Cheyenne, the Capital, this TWENTY-FOURTH *day of* FEBRUARY *A. D.* 1906.

F. Chatterton
Secretary of State.

By C. L. Hinkle
Deputy.

EPA7-001938

CERTIFICATE OF INCORPORATION

OF

LA HARPE SMELTING COMPANY.

That we, the undersigned, desiring to associate ourselves into a corporation, under and in pursuance of the laws of the State of Wyoming, do hereby certify:

I.

That the corporate name of said corporation shall be

LA HARPE SMELTING COMPANY.

II.

That the object and purpose for which this our said corporation is formed, organized and incorporated is to carry on a general manufacturing business; and in furtherance of said business to acquire, by purchase, lease, contract, donation, mining or otherwise, zinc and other ores, minerals, coal, stone, clay, shale, natural gas and oil and any other natural substances of the base general or different character, and to reduce and refine the same, and to manufacture spelter and other products, articles and commodities therefrom, and sell or otherwise dispose of the same, also to manufacture or acquire any or all other articles, substances materials and ingredients that enter into the manufacture or production of any of the above mentioned products, articles and commodities; also to acquire, own, hold, possess, maintain and operate by purchase, lease, donation, manufacture, construction, condemnation or otherwise, any and all such real, personal or mixed property, including lands, plants, manufactories, works, work shops, structures, mills, wells, quarries, pipe lines, pipes, equipment, apparatus, machinery, tools, implements, appliances, water works, electric or other power plants, reservoirs, ditches, flumes, tram ways and other lines for the trans-

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portation of material and other property) (but not as common carriers) mining rights, gas rights, oil rights, rights-of-way, franchises, licenses and privileges as it may deem necessary or convenient for the carrying on of the aforesaid business of said corporation, and to plat portions of such real estate as it may own into town lots and erect thereon buildings for the use of its employes, also to apply for, obtain, register, purchase, lease or otherwise acquire, and to hold, own, use, operate, introduce and sell, grant licenses in respect of, and assign or otherwise dispose of any or all patents, patent rights, trade-marks, formulae, secret processes, trade-names, distinctive marks and inventions, improvements and processes, for use in or about or in anywise connected with or relating to the aforesaid business of said corporation or any part or branch thereof; and to pay cash or property, or issue the capital stock of this company as full paid and non-assessable, in such amounts as the trustees may determine, for any or all real, personal or mixed property purchased, leased, or otherwise acquired by said company; also to sell, exchange, lease, mortgage, pledge or otherwise dispose of all or any of the real, personal or mixed property belonging to said corporation, on such terms and for such prices as may be deemed best, with full power to receive in payment for the same, money, personal securities, contracts, real estate, shares of capital stock or bonds of any other company or companies, or property, real, personal or mixed of any other kind or character; and generally to do any and all things and transact any and all business that may be in anywise necessary, incidental or appurtenant to the power, purpose or business of said corporation; and to do and perform and such things and acts as may be necessary, incidental or convenient to the carrying out of the object and purpose for which said corporation is created as fully as may and can be done under the laws of the State of Wyoming.

III.

That the capital stock of said corporation shall be Two

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Hundred and Twenty Thousand ($220,000.00) Dollars, divided into Twenty-two Hundred shares of the par value of One Hundred ($100.00) Dollars each.

IV.

That the term of existence of said corporation shall be Fifty (50) years.

V.

That the number of trustees who shall manage the affairs of said corporation is five, and each trustee shall be the legal holder of at least one share of stock in said corporation during his encumbency of said office, and if any trustee ceases to be the holder of such stock his office or trusteeship shall thereupon become vacant. The names of the trustees who shall manage the concerns of said corporation for the first year and until their successors are duly elected and qualified are: [illegible], Timothy F. Burke and Edward T. Clark.

VI.

Said corporation shall have power to carry on its aforesaid business both within and without the State of Wyoming, and the principal part of the business of said corporation within the said state is to be transacted at the City of Cheyenne, in Laramie County. Said corporation is also formed for the purpose of carrying on and shall have power to carry on part of its said business at the City of Iola, Allen County, in the State of Kansas, and at such other places within any of the aforesaid states or any other states or territories of the United States as may be determined upon by the Board of Trustees and as the business of said corporation may require.

VII.

The trustees of said corporation shall have power to make and to change or amend, such by-laws as they may deem proper for the management, control and disposition of the stock, property and business affairs of said corporation, within the object and purpose for

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which it is formed, and not inconsistent with the laws of the State of Wyoming; and to provide for the appointment of an executive committee from among their membership and to provide for the appointment or election of all officers of said corporation; and to prescribe the duties of the aforesaid committee and the duties and compensation of the officers, servants and employes of said corporation; and to provide for and set apart such working capital from time to time as may be deemed advisable; and in case of vacancy in the Board of Trustees of said corporation the remaining trustees shall have power to fill such vacancy in the manner provided by the by-laws.

VIII.

That the trustees of said corporation may hold their meetings at the City of Iola, in Allen County, Kansas, and at such other place as they may provide for in the by-laws of said corporation with the same validity and effect as if held within the City of Cheyenne, or some other place within the State of Wyoming.

IN WITNESS WHEREOF we have hereunto set our hands and to a duplicate hereof this 24th day of February , A. D. 1906.

Timothy F. Burke.

Jno. F. Goshorn.

Edward T. Clark

IN THE PRESENCE OF:

Margaret Bailey

State of Wyoming)
)ss
County of Laramie)

On this 24th day of February , A. D. 1906, before me a Notary Public in and for said county of Laramie in the State of Wyoming, personally appeared Timothy F. Burke, Jno. F. Goshorn and Edward T. Clark each personally known to me as the identical person whose name is subscribed to the foregoing certificate of incorporation and each for himself duly acknowledged that he subscribed his name to and executed the foregoing instrument freely and voluntarily and for the uses and purposes therein set forth.

Given under my hand and Notarial seal this 24th day of February , A. D. 1906.

(SEAL)

Margaret Bailey
Notary Public.

My commission expires December 31, 1908.

EPA7-001942

DOCUMENT INFO

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Filename: 1905 NJZ Officers.pdf

DOCUMENT INFO

THE MANUAL OF STATISTICS

STOCK EXCHANGE HAND-BOOK

1905

TWENTY-SEVENTH ANNUAL ISSUE

RAILROAD SECURITIES · INDUSTRIAL SECURITIES ·
GOVERNMENT SECURITIES · STOCK EXCHANGE QUOTATIONS ·
MINING · GRAIN AND PROVISIONS · COTTON · MONEY ·
BANK AND TRUST COMPANIES

PRICE FIVE DOLLARS

THE MANUAL OF STATISTICS COMPANY

25 WEST BROADWAY, NEW YORK

EPA7-001943

NEW HAVEN IRON & STEEL CO.

A corporation formed under the laws of New Jersey, July 28, 1899. The company acquired the plant at New Haven, Conn., formerly owned by the New Haven Rolling Mill Co. The plant has an annual capacity of 30,000 tons of bar iron and steel.

Stock.....Par $5.....Authorized, $500,000.....Issued, $500,000

Transfer Agent, New Jersey Corporation Guarantee & Trust Co., Camden, N. J. Registrar, Girard Trust Co., Philadelphia.

In the fiscal year ending August 31, 1900, the company paid 16 per cent. on its stock. In 1900-01 and 1901-02 paid 9 per cent., and in 1903 1 per cent. In the fiscal year ending August 31, 1904, 6 per cent. Dividends are semi-annual, March and September.

EARNINGS

Year ending August 31

	Gross	Net	Dividends	Surplus
1900-01.....	$584,805	$75,629	$45,000	$30,629
1901-02.....	693,195	68,023	45,000	23,023
1902-03.....	587,949	32,942	50,000	Def. 17,058
1903-04.....	369,112	3,222	30,000	" 26,778

President, Christian C. Kauffman, Columbia, Pa. Vice-President, A. Loudon Snowden, Philadelphia. Secretary and Treasurer, Clarence Kennedy Crossan, Philadelphia.

Directors—Kennedy Crossan, Philadelphia. Christian C. Kauffman, Columbia. John B. Peddle, Woodbury, N. J. Charles A. Porter, Philadelphia. A. Loudon Snowden, Philadelphia. George D. Watrous, New Haven, Conn. Joseph W. Yocum, Columbia.

Corporate office, 419 Market street, Camden, N. J. Main office, Broad and Chestnut streets, Philadelphia. Annual meeting, first Monday in October.

NEW HAVEN WATER CO.

A corporation formed under the laws of Connecticut in 1849. The company supplies water in the city of New Haven, Conn., for public and domestic purposes. Water is obtained from Lakes Whitney and Saltonstall and other bodies of water. It has two steam pumping plants with reservoirs and mains, and in 1902 began the construction of important extensions and improvements, including a thirteen-acre sand filtration plant. A controlling interest in the stock of the West Haven Water Co. is owned by this company.

Stock.....Par $50.....Authorized, $5,000,000 .....Issued, $2,500,000

Stock is transferred at the office of the company, New Haven. Registrar, George W. Curtis, City Bank, New Haven, Conn.

Dividends at the rate of 8 per cent. are paid semi-annually, in January and July.

The stockholders, on December 1, 1904, had the right to subscribe at par for 20 per cent. of their holdings in 4 per cent. debenture bonds, the amount of which will be $500,000. The bonds are to be issued July 1, 1905, and are convertible into stock at par at the option of the directors between July 1, 1910, and July 1, 1915. The purpose of the bond issue is to provide for improvements.

President and Treasurer, Eli Whitney, New Haven, Conn. Vice-President, James English, New Haven. Secretary, David Daggett, New Haven. Assistant Treasurer, A. F. Hemingway, New Haven.

Directors—Max Adler, New Haven. James D. Dewell, New Haven. James English, New Haven. Richard M. Everit, New Haven. Samuel Hemingway, New Haven. Samuel E. Merwin, New Haven. Winston J. Trowbridge, New Haven. George D. Watrous, New Haven. Eli Whitney, New Haven.

Main office, 100 Crown street, New Haven, Conn. Annual meeting, first Monday in February.

NEW JERSEY ZINC CO.

A corporation formed under the laws of New Jersey, October 30, 1880. The title was originally the New Jersey Zinc & Iron Co., which was changed to the present style in 1897. The business of the company is the manufacture of oxide of zinc and similar products. Its chief works are at Newark, N. J.

Stock.. ...Par $100.....Authorized, $10,000,000.....Issued, $10,000,000

Stock is transferred at the office of the company, New York.

Dividends at the rate of 12 per cent. per annum have been paid on the stock of the company.

EPA7-001944

FUNDED DEBT

1st mort., 4 per cent., due Oct., 1926, April and Oct..... $4,000,000

The authorized amount of the 1st mortgage is $10,000,000. Trustee, Farmers' Loan & Trust Co., New York. Interest on the bonds is paid at the office of the company, New York.

The company had a 5 per cent. 1st mortgage, which was withdrawn and canceled when the new 1st mortgage 4 per cent. bonds were created in 1901.

President, Stephen S. Palmer. Vice-President, William P. Hardenburgh. Secretary, A. P. Cobb. Treasurer, H. G. Wardner.

Directors—William P. Hardenburgh. August Heckscher. D. B. Jones. Stephen S. Palmer. M. Taylor Pyne. J. L. Riker. Edwin M. Squier. John Price Wetherill. Samuel Price Wetherill.

Main office, Newark, N. J. New York office, 71 Broadway.

NEW ORLEANS RAILWAYS CO.

A corporation formed under the laws of New Jersey, January 28, 1902. It controls practically all the street railway and lighting facilities of New Orleans, and operates a total of 188 miles of track. It is a conbination of the following companies, which are controlled through ownership of their stocks. In the case of the New Orleans Gas Light Co., this company owns a minority, but has an option on the rest of the stock running until 1925.

New Orleans City Railroad Co.
New Orleans & Carrollton Railroad, Light & Power Co.
New Orleans & Pontchartrain Railway Co.
Orleans Railroad Co.
St. Charles Street Railroad Co.
New Orleans Gas Light Co.
New Orleans Lighting Co.
Edison Electric Co.
Merchants' Electric Co.

Interest due January 1 on the company's 4½ per cent. bonds was defaulted, and Receivers were appointed.

In 1904 suit was brought against the company by the Attorney-General of the State of Louisiana, on the ground that its capitalization was in violation of the State laws. An agreement was finally reached by which the company was to reduce its capital by $20,000,000. A reorganization committee was formed, Otto T. Bannard, New York, Chairman, M. N. Bush, 26 Broad street, New York, Secretary. The committee, in February, 1905, presented a reorganization plan. The plan, it was stated, was drawn to meet the requirements of the State authorities as to the above reduction of the company's capital, and at the same time provide funds for the payment of the floating debt and for the completion of further improvements, as well as to take up the stock of the New Orleans Gas Light Co., on which the company has an option. It provided for foreclosure and the formation of a new company, which is to issue $20,000,000 common stock, $10,000,000 preferred stock and $30,000,000 30-year 4½ per cent. bonds.

The disposition of the new securities and the terms under which the old stock and 4½ per cent. bonds are to be exchanged for the same are shown as follows:

	Pay	Receive Per Cent.		
	Per Cent.	New Bonds	New Preferred	New Com.
4½ per cent. bonds.....		75	25	--
Preferred stock.....	20	..	20	100
Common stock.....	10	..	10	35

The holders of the assenting 4½ per cent. bonds are to receive $22.50 on each $1,000 bond in cash for adjustment of interest thereon to January 1, 1905.

Of the new 30-year 4½ per cent. bonds to be created under the plan, $12,804,500 will be reserved to retire underlying bonds, and $3,818,750 reserved for improvements, etc., the amount issuable forthwith against bonds deposited being $13,356,750.

It was announced that assenting securities must be deposited on or before February 28, the depositaries of the committee being the New York Trust Co., New York, the Hibernia Bank & Trust Co., New Orleans, and the Fidelity Trust Co., Louisville.

Stock..Par $100...Authorized { com., $30,000,000 / pref., 10,000,000 } Issued { com., $27,588,900 / pref., 8,792,400 } $36,3[illegible]

The preferred stock is 4 per cent., cumulative. Transfer Agents, New York Trust Co., New York; United States Safe Deposit & Savings Bank, New Orleans; Fidelity Trust Co., Louisville. Registrars, New Orleans National Bank, New Orleans; Columbia Finance & Trust Co., Louisville.

The capital stock of the company was originally $5,000,000, but was increased to $40,000,000 in May, 1902. It was provided that all the stock should be held in a voting trust for five years

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Filename: 1908 NJZ Officers.pdf

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THE MANUAL OF STATISTICS

STOCK EXCHANGE HAND-BOOK

1908

THIRTIETH ANNUAL ISSUE

RAILROAD SECURITIES · INDUSTRIAL SECURITIES
GOVERNMENT SECURITIES STOCK EXCHANGE QUOTATIONS
MINING · GRAIN AND PROVISIONS · COTTON · MONEY ·
BANK AND TRUST COMPANIES

PRICE FIVE DOLLARS

THE MANUAL OF STATISTICS COMPANY

20 VESEY STREET, NEW YORK

EPA7-001946-

the riparian lands, amounting to some 4,600 acres, belonging to the Hackensack Meadows Co. on the Hackensack and Passaic rivers, between Jersey City and Newark, N. J.

Stock.....Par $100.....Authorized, $3,000,000.....Issued, $3,000 000

FUNDED DEBT

1st and collateral trust mort., 5 per cent., due Oct., 1925, Apr. and Oct.....$1,850,000

The mortgage is for $3,000,000. Trustee, Standard Trust Co., New York. The bonds are subject to call at 102½ and interest.

There is also a mortgage upon the property of the Hackensack Meadows Co, for $1,211,000 at 4½ per cent., due 1921.

President, Walter G. Oakman, New York. Vice-President, Anson M. Bangs, New York. Secretary, Charles C. VanAnglen, New York. Treasurer, Frederick W. Walz, New York.

Directors—Anson M. Bangs, New York. William M. Barnum, New York. Pliny Fisk, New York. Andrew Freedman, New York. W. C. Kinney, Jersey City. William C. Lane, New York. Walter G. Oakman, New York. George R. Sheldon, New York.

Main office, 5 Nassau street, New York.

NEW JERSEY ZINC CO.

A corporation formed under the laws of New Jersey, October 30, 1880. The title was originally the New Jersey Zinc & Iron Co., which was changed to the present style in 1897. The business of the company is the manufacture of oxide of zinc and similar products. Its chief works are at Newark, N. J.

Stock.. ...Par $100.....Authorized, $10,000,000.....Issued, $10,000,000

Stock is transferred at the office of the company, New York.

Dividends at the rate of 16 per cent. per annum have been paid on the stock of the company.

FUNDED DEBT

1st mort., 4 per cent., due Oct., 1926, April and Oct..... $4,000,000

The authorized amount of the 1st mortgage is $10,000,000. Trustee, Farmers' Loan & Trust Co., New York. Interest on the bonds is paid at the office of the company, New York.

President, Stephen S. Palmer. Vice-President, William P. Hardenburgh. Secretary, A. P. Cobb. Treasurer, H. S. Wardner.

Directors—Mark T. Cox. William P. Hardenbergh. August Heckscher. D. B. Jones. Stephen S. Palmer. M. Taylor Pyne. John L. Riker. Edwin M. Squier. Samuel Price Wetherill.

Main office, Newark, N. J. New York office, 71 Broadway.

NEW ORLEANS RAILWAY & LIGHT CO.

A corporation formed under the laws of Louisiana, June 12, 1905. The company is a reorganization of the New Orleans Railways Co. The latter company was formed under the laws of New Jersey, January 28, 1902, and acquired practically all the street railway and lighting facilities of New Orleans, the system having a total of 192.50 miles of track. It was a combination of the following companies, which are controlled through ownership of their stocks:

New Orleans City Railroad Co.	Orleans Railroad Co.
New Orleans & Carrollton Railroad, Light & Power Co.	St. Charles Street Railroad Co.
	New Orleans Gas Light Co.
New Orleans & Pontchartrain Railway Co.	New Orleans Lighting Co.

Details as to the reorganization are given in the MANUAL for 1907.

Stock..Par $100...Authorized { com., $20,000,000 / pref., 10,000,000 } Issued { com., $20,000,000 / pref., 10,000,000 } $30,000,000

The preferred stock is 5 per cent., non-cumulative. Transfer Agents, New York Trust Co., New York; Whitney-Central National Bank, New Orleans. Registrars, Morton Trust Co., New York; Hibernia Bank & Trust Co., New Orleans.

The first dividend on the new preferred stock was 1¼ per cent. quarterly, paid January 15, 1906, and similar payments continued to be made, the dividend periods being January, April, July and October. The October, 1907, dividend, however, was reduced to 62½ cents per share, or ¼ of 1 per cent., and the January, 1908, dividend was passed.

EPA7-001947

DOCUMENT INFO

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Filename: 1911-01-12 Collinsville Get Smelter article.pdf

DOCUMENT INFO

THE COLLINSVILLE NEWS

VOL. 12 | COLLINSVILLE, OKLA., JAN. 12 1911. | NO. 35

$1.00 Per Year. | PROTECT THE TOILER and PRODUCER. | Clubbing Rates Made

$ $ $ $ $

OVER FIVE MILLION
-: IN 1910 :-

We Sold Bank Drafts to the Amount of	$505,586.00
We Received Deposits to Amount of	$2,109,848.00
We Cashed Checks to the Amount of	$2,782,874.00
TOTAL	$5,398,308.00

We furnish these figures simply to give you an idea of the enormous amount of business handled over our counter during the year just past, and we are going to do even better this year. We are trying to give our customers the very best there is in banking. We have tried to make the words, "FARMERS & MERCHANTS BANK" synonymous with the words "Safety, Uprightness and Courtesy." We have tried to make our institution something more than a money-making machine and while we have hewed close to the line in regard to what we consider safe banking, we have tried so far as it was in our power, to help every one with whom we, as an institution, came in contact. If you are not already a depositor, open an account today, and enjoy the superior facilities offered to you through your association with the

FARMERS & MERCHANTS BANK
Your Deposits are Guaranteed.

$ $ $ $ $

COLLINSVILLE GET SMELTER

Tulsa World Reports one Landed Here.

Special to the World

Collinsvile, Okla., Jan. 11.—The thing which has been puzzling the people of Collinsville for some time past what means the action of the Santa Fe officials and the party of surveyors working just south of here was learned today when definite information was gained concerning the removal to this place of the Prime Western Smelting Company of Iola, Kansas

It is understood that definite consumation of the deal was made in Tulsa yesterday between Santa Fe men and C A DeSaulis of the smeltering company

From what can be learned, the Prime Western company will establish a five block size smelter just south of Collinsville, between here and Owasso. The grounds are already laid off and surveyed, and it is presumed that the smelting company intends establishing a small town around the plant, which, it is understood, will cost in the neighborhood of $100,000

One of the chiefest reasons for the removal of the Prime Western company from Iola to this place is the question of gas here and the only coal will be in producing it. The plant when fully completed, will use 250 men

It is understood that the smelting company has considered propositions made by Tulsans and Tulsa's Commercial organization but they could not overcome the treasure which the company holds in the way of gas.

Collinsville is located on the Santa Fe about 18 miles north and east of Tulsa. Local men have admitted the attempt to land the smelting company within the past several weeks. It is safe to say, however, that much local benefit will be derived by reason of the locating of the concern so near to Tulsa

The location of the company at Collinsville, it is understood, did not involve the question of a bonus, the smelting company choosing that place only because of its ownership of surrounding gas lands

Hog Island Howard is the name of a new law firm in Claremore! Judge Bonds will be remembered by all, as the first and very efficient and accommodating Judge of the county court of Rogers county.

News failed to report the incident of the home of Hal Hanson being burned on New Years eve and Mr. Hanson was badly burn about the head. It was very unfortunate, as they were literally cleaned out of house and home

Riley Preston died at the home of R. Hegedus Wednesday night and was buried in the Adkins cemetery Thursday.

GUARANTEE ACT IS HELD GOOD

Oklahoma, Nebraska And Kansas Measures Are Constitutional

Washington, Jan 3.—The bank guaranty laws of Oklahoma, Nebraska and Kansas were declared constitutional today by the supreme court of the United States, and thus the fight over the policy of guaranteeing, through the state, of deposits in banks, was won by the advocates of such a policy.

The opinions of the court were announced by Justice Holmes. He said the main objection to the laws was that the assessment of banks by the state in order to create a fund to guarantee the deposits in other banks within the state took private property of one bank for the private use of another without compensation.

Justice Holmes admitted that there might be a taking of private property without return to pay liabilities in a rival in business, but he said there were several considerations on the other side of the question.

"In the first place," he said, "it is established by cases that an ordinary not to advantage may justify a comparatively insignificant taking of private property for which, in its immediate purpose, is a private use.

"It would seem that there may be other cases besides the gun in the purse of the Noble State Bank, was backed by contributions from many leading bankers of Oklahoma who were then unfriendly to the bank guaranty law. The best legal talent was engaged on both sides and C. B. Ames, of this city, was special counsel for the state in defending the guaranty law. He made his final arguments at Washington only a few days ago.

The fundamental principle involved in the case was the question. Whether one bank could be compelled to contribute to a general fund to protect the deposits of all state banks generally. The attorneys for the Noble state bank contended that in requiring this the law was an infringement of a leading principle of the United States constitution. The case was filed before District Judge A. H. Huston, at Guthrie. He was asked to grant a perpetual injunction restraining the state banking board and bank commissioners from collecting or levying an assessment for the guaranty fund, and from forbidding the closing of the Noble bank for refusing to pay the same. Judge Huston upheld the guaranty law and refused the injunction. The case was appealed to the supreme court of the state and the guaranty law was again upheld by a unanimous opinion, in a masterly opinion, in June 1910, outside of law and upheld District Judge Huston in his refusal to grant the injunction. The decision of the supreme court of the state was appealed to the supreme court of the United States, where they have just again and finally. New every day one of taxation, in which the share of each party in the benefit of a scheme of mutual protection is sufficient compensation for the correlative burden that it is compelled to assume. At least if we have a case within the reasonable exercise of the police power as above explained, no more need be said."

The justice then proceeded to justify the laws under the police powers. The police powers, he said may be put forth in aid of what is sanctioned by usage, or held by the prevailing morality or strong and preponderant opinion to be greatly and immediately necessary to the public welfare.

The laws came within this built, he held

The news that the supreme court of the United States had affirmed the Oklahoma supreme court in upholding the constitutionality of depositor's bank guaranty law was received with considerable interest here yesterday. Within fifteen minutes after M. L. Turner, of the West End National Bank, had received a telegram announcing the decision, it was a subject of vast discussion in political and banking circles of the city.

The case involved was that of the Noble State bank of Noble versus Governor C. N. Haskell, et al, the other defendants being the other members of the state banking board and the bank commissioner. It was a case originated in January, 1908, to test the depositor's guaranty plan generally, and though he was not a party to the case, Governor Haskell was made defendant as the chief executive of the state. The case was originated in the district court of Cleveland county, and was appealed to the supreme court of the state, which rendered a decision in favor of the plaintiff, the Noble State bank. The case was then appealed to the supreme court of the United States, where they have just again and finally. New State Tribune

EPA7-001948

DOCUMENT INFO

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Filename: 1912 The_Manual_of_Statistics-NJZ.pdf

DOCUMENT INFO

THE MANUAL OF STATISTICS

STOCK EXCHANGE HAND-BOOK

1912

THIRTY-FOURTH ANNUAL ISSUE

RAILROAD SECURITIES · INDUSTRIAL SECURITIES
GOVERNMENT SECURITIES · STOCK EXCHANGE QUOTATIONS
MINING · GRAIN AND PROVISIONS · COTTON · MONEY ·
BANK AND TRUST COMPANIES

PRICE FIVE DOLLARS

THE MANUAL OF STATISTICS COMPANY

20 VESEY STREET, NEW YORK

EPA7-001949

EARNINGS

	Gross	Net	Dividends	Surplus
1904	$7,323,561	$1,443,242	$1,320,447	$122,795
1905	8,071,244	1,624,122	1,458,648	165,474
1906	9,313,000	1,823,650	1,672,857	150,793
1907	10,679,625	2,166,203	1,872,817	293,386
1908	11,259,130	2,560,413	2,076,842	483,571
1909	12,086,783	3,183,949	2,191,866	992,083
1910	13,171,708	3,193,994	2,350,686	843,308

The net earnings are the amount earned in excess of expenses and interest.

Chairman, Thomas Sherwin, Boston. President, Jasper N. Keller, Surry, N. H. Vice-President, Francis A. Houston, Concord, Mass. Vice-President, Henry S. Hyde, Springfield, Mass. Secretary, Edmund W. Longley, Boston. Treasurer, William R. Driver, Boston.

Directors—Charles F. Ayer, Boston. Union N. Bethell, Montclair, N. J. John H. Cahill, New York. William J. Denver, Boston. Francis H. Dewey, Worcester, Mass. William H. Elliot, Keene, N. H. Edward Hall, New York. John F. Hill, Augusta, Me. Henry S. Hyde, Springfield. Matt B. Jones, Newton, Mass. Jasper N. Keller, Boston. Moses G. Parker, Lowell, Mass. Thomas Sherwin, Boston. Theodore N. Vail, New York.

Main office, 50 Oliver street, Boston. Annual meeting, first Monday in May, at New York.

NEW HAVEN WATER CO.

A corporation formed under the laws of Connecticut in 1849. The company supplies water in the city of New Haven, Conn., for public and domestic purposes. Water is obtained from lakes Whitney and Saltonstall and other bodies of water. It has two steam pumping plants with reservoirs and mains, and in 1906 completed important extensions and improvements, including a thirteen-acre sand filtration plant. A controlling interest in the stock of the West Haven Water Co. is owned by this company. In February, 1908, it acquired control of the Milford (Conn.) Water Co.

Stock.....Par $50.....Authorized, $5,000,000 .....Issued, $3,500,000

Stock is transferred at the office of the company, New Haven, Conn. Registrar, Samuel W. Lloyd, City Bank, New Haven, Conn.

Dividends at the rate of 8 per cent. are paid semi-annually, in January and July.

In May, 1909, the stockholders had the right to subscribe at $75 per share for $500,000 new stock, payments to be $25, July 8, 1909; $25, January 8, 1910; and $25, July 8, 1910; subscription payments to bear 5 per cent. interest.

The stockholders, on December 1, 1904, had the right to subscribe at par for 20 per cent. of their holdings in 4 per cent. debenture bonds, $500,000. The bonds were issued July 1, 1905, convertible into stock at par July 1, 1915, and convertible after July 1, 1910 at the option of the directors.

The stockholders of record May 30, 1911, had the right to subscribe on June 21, 1911, at par for 25 per cent. of their holdings $750,000, 4½ per cent. debenture bonds, to be dated July 1, 1912, maturing July 1, 1962, and convertible into stock at the company's option before July, 1, 1925, at the rate of $150 of debentures for $100 of stock. Subscriptions were made payable, 40 per cent. July 7, 1911; 30 per cent. January 7, 1912, and 30 per cent. July 7, 1912.

FUNDED DEBT

Debentures, convertible 4 per cent., due July, 1910-15, Jan. and July..... $500,000

See above regarding convertibility of the debentures.

President and Treasurer, Eli Whitney, New Haven, Conn. Vice-President, James English, New Haven. Secretary, David Daggett, New Haven. Assistant Treasurer, A. F. Hemingway, New Haven.

Directors—Max Adler, New Haven, Conn. Frank L. Bigelow, New Haven. W. Perry Curtis, New Haven. James English, New Haven. Samuel Hemingway, New Haven. Burton Mansfield, New Haven. Winston J. Trowbridge, New Haven. George D. Watrous, New Haven. Eli Whitney, New Haven.

Main office, 100 Crown street, New Haven, Conn. Annual meeting, first Monday in February, at New Haven.

THE NEW JERSEY ZINC CO.

A corporation formed under the laws of New Jersey, October 30, 1880. The title was originally the New Jersey Zinc & Iron Co., which was changed to the present style in 1897. The business of the company is the manufacture of oxide of zinc spelter and similar products. Its works are at Newark, N. J., and its mines at Franklin Furnace, N. J.

EPA7-001950

Stock.. ...Par $100.....Authorized, $10,000,000.....Issued, $10,000,000

Stock is transferred at the office of the company, New York.

Dividends at the rate of 20 per cent. per annum have been paid on the stock of the company with extra dividends at intervals.

FUNDED DEBT

1st mort., 4 per cent., due Oct., 1926, April and Oct..... $4,000,000

The authorized amount of the 1st mortgage is $10,000,000. Trustee, Farmers' Loan & Trust Co., New York. Interest on the bonds is paid at the office of the company, New York.

President, Stephen S. Palmer. Vice-President, William P. Hardenbergh. Vice-President, Edgar Palmer. Secretary, A. P. Cobb. Treasurer, H. S. Wardner.

Directors—William P. Hardenbergh. August Heckscher. Thomas D. Jones. Edwin S. Marston. Edgar Palmer. Stephen S. Palmer. John J. Riker. Edwin M. Squier. Samuel Price Wetherill.

Main office, Newark, N. J. New York office, 55 Wall street.

NEW ORLEANS RAILWAY & LIGHT CO.

A corporation formed under the laws of Louisiana, June 12, 1905. The company is a reorganization of the New Orleans Railways Co. The latter company was formed under the laws of New Jersey, January 28, 1902, and acquired practically all the street railway and lighting facilities of New Orleans, the system having a total of 197.72 miles of track. It was a combination of the following companies, which are controlled through ownership of nearly all their stocks:

New Orleans City Railroad Co.
New Orleans & Carrollton Railroad, Light & Power Co.
New Orleans & Pontchartrain Railway Co.
Orleans Railroad Co.
St. Charles Street Railroad Co.
New Orleans Gas Light Co.
New Orleans Lighting Co.

Details as to the reorganization are given in the MANUAL for 1907.

In May, 1911, this company's stockholders were offered the privilege of exchanging their stock for that of the American Cities Co., which also acquired the American Cities Railway & Light Co. Under the plan New Orleans Railway & Light common was exchangeable for 35 per cent. in American Cities Co. preferred and 25 per cent. of the latter's common. New Orleans Railway & Light preferred was exchangeable for 83⅓ per cent. in new preferred and 16⅔ per cent. in new common. Under this arrangement the American Cities Co. acquired 87.5 per cent. of the preferred and 96 per cent. of the common stock of this company.

Stock..Par $100...Authorized { com., $20,000,000 / pref., 10,000,000 } Issued { com., $20,000,000 / pref., 10,000,000 } $30,000,000

The preferred stock is 5 per cent., non-cumulative. Transfer Agents, New York Trust Co., New York; Whitney-Central National Bank, New Orleans. Registrars, Guaranty Trust Co., New York; Hibernia Bank & Trust Co., New Orleans.

The initial dividend on the preferred stock was 1¼ per cent. quarterly, paid January 15, 1906, and similar payments continued to be made, the dividend periods being January, April, July and October. The October, 1907, dividend, however, was reduced to 62½ cents per share, or ⅝ of 1 per cent., and no further dividends were paid until January, 1911, when 2½ per cent. was paid. In April, 1911, paid 1¼ per cent. and the same rate was paid in July and October and on December, 28, 1911.

FUNDED DEBT

New Orleans Ry. & Light gen. mort., 4½ per cent., due July, 1935, Jan. and July..	$17,544,000
" " " " " ref. and gen. mt., 5 per ct., due Nov., 1949, May and Nov.	3,381,000
New Orleans City Ry. gen. mort., 4-5 per cent., gold, due July, 1943, Jan. and July.	3,200,000
New Orleans City & Lake 1st mort., 5 per cent., gold, due Jan., 1943, Jan. and July.	2,618,500
New Orleans Traction, 1st mort., 6 p. c., gold, due 1917, Jan. and July.....	46,000
" " " Power House, 1st mort., 5 p. c., due July, 1943, Jan. and July.	200,000
New Orleans & Carrollton, con. mort., 5 per cent., due Feb., 1933, Jan. and July...	2,000,000
Canal & Claiborne con. mort., 6 per cent., gold, due May, 1946, May and Nov.....	749,000
Edison Electric of N. O. 1st mort., 5 per cent., due Jan., 1929, Jan. and July.....	2,377,000
Merchants' Electric Co. 1st mort., 5 per cent., gold, due July, 1929, Jan. and July...	300,000
Orleans Railroad 1st mort., 6 per cent., gold, due 1912, Jan. and July.....	260,500
" " 2d mort., 6 per cent., gold, due 1912, Jan. and July.....	78,950
St. Charles Street Railway 1st mort., 4 per cent., gold, due Jan., 1952, Jan. and July..	375,000
Total.....	$22,129,950

EPA7-001951

DOCUMENT INFO

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Filename: 1912-01-18 NJZ Pension Dept Rpt.pdf

DOCUMENT INFO

REPORT OF SUPERINTENDENT OF PENSION DEPARTMENT

Eleven Months - February to December 1911, Inclusive.

Income

Contributed by Associated Companies	9500.00	
Interest	79.70	9579.70

Paid Out:

Pensions Paid	7414.45	
Expenses and Salaries	1457.81	8872.26
Balance December 31, 1911.		707.44

There have been 49 pensions granted, of which 47 are active. The two which are not active are Charles Horn, at Bethlehem, still employed, and Albert Van Billiard, effective January 1, 1912. During the year one pensioner died, Patrick Crowley, Frankfort [illegible] January 7.

PENSIONS PAID PER MONTH

February	276.45	
March	450.45	
April	554.95	
May	791.95	
June	753.95	
July	753.95	
August	742.95	
September	742.95	
October	760.95	
November	760.95	
December	784.95	7414.45

ESTIMATED REQUIREMENTS
SIX MONTHS ENDING JUNE 30th, 1912.

Pensions	5063.70	
Expenses and Salaries	716.30	
		5780.00

W. H. Kenyon

EPA7-001952

For Mr. Catlin

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REPORT OF THE NEW JERSEY ZINC COMPANY

PENSION DEPARTMENT

New York, Jan. 18, 1912.

For the eleven months ending December 31, 1911, sixty-eight applications for pensions have been considered by the Pension Board, forty-nine of which have been allowed and nineteen disallowed.

The allowed pensions are classified as follows:

Under	Class	A.	7	with aggregate monthly allowance of			$140.70
"	"	B.	10	"	"	"	189.25
"	"	E	31	"	"	"	487.00
"	"	D	1	"	"	"	8.00

The large number of Class E pensioners is occasioned by the closing down of the Newark and South Bethlehem Plants, and the consequent laying off of employees who have had long service with the companies, and whose physical condition renders them unfit for employment elsewhere.

These cases having been disposed of, there will be no material increase in the amount required for the payment of pension allowances for some time to come.

The receipts and expenditures for the eleven months ending December 31st were as follows:

Income:

Contributed by Associated Companies	9500.00	
Interest on Deposits	79.70	9579.70

Paid Out:

Pension Allowances	7414.45	
Salaries and Expenses	1457.81	8872.26
Balance December 31,		707.44

Estimated Requirements
Six Months Ending June 30, 1912.

Pension Allowances	5063.70	
Salaries and Expenses	716.30	5780.00

It has been thought expedient to call for contributions to the Pension Fund by the Associated Companies to an aggregate amount of $5800.00, on account of expenses of administration and necessary outlay for pension allowances during the six months end-

ing June 30, 1912. In accordance with the basis of determining the proportions under the Pension Agreement the amounts to be contributed by the respective companies are as follows:

	Percentage of Whole	Amount
The New Jersey Zinc Co.	21.73	$1260.54
The New Jersey Zinc Co. (of Pa.)	35.13	2037.54
Mineral Point Zinc Co.	20.98	1216.64
The Bertha Mineral Co.	1.52	88.16
The Empire Zinc Co. (Colo.)	6.16	357.28
Prime Western Spelter Co.	7.51	435.58
Tulsa Fuel and Mfg. Co.	4.56	264.48
Empire Zinc Co. (of Mo.)	.22	12.76
The Palmer Land Co.	.82	47.56
Palmer Water Co.	.28	16.24
Chestnut Ridge Railway Co.	1.09	63.22
	100.00	$5800.00

By Order of the Pension Board,

A. P. Cobb, Secretary.

The following have been appointed as a Pension Board to serve for the year 1912, and until their successors are appointed.

J. R. Hayes, Jr. Chairman.
A. P. Cobb, Secretary.
R. M. Catlin.
J. H. Janeway, Jr.
W. A. Jones.

Superintendent of Pensions - W. S. Cortright.

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MOHAWK MINING COMPANY

History: Incorporated in November, 1898, in Michigan. Company owns a tract of 800 acres in Sections 27, 28, 33, 34, Town 57 North, Range 32 West, in Keweenaw County, four miles northeast of the property of the Calumet & Hecla Mining Company. Company has a mill site of 140 acres, with a frontage of ¾ of a mile on Traverse Bay, Lake Superior, about ¼ of a mile from the mouth of the Tobacco River. The mineral lands aggregate 800 acres, forming an irregular tract with its axis on the strike of the lode.

Management: OFFICERS: J. R. Stanton, Pres.; F. McM. Stanton, Treas.; Geo. W. Drucker, Sec., New York. DIRECTORS: J. R. Stanton, F. McM. Stanton, F. W. Denton, Jas. Dunstan, W. A. Paine, Boston, Mass. ANNUAL MEETING: Last Tuesday in March. MAIN OFFICE: 15 William St., New York. MINE OFFICE: Kearsarge, Mich.

Comparative Income Account, Years Ended Dec. 31

	1915	1914	1913	1912	1911	1910
Gross receipts	$2,700,843	$1,383,330	$887,618	$1,929,428	$1,527,108	$1,493,816
Expenses	1,145,894	913,436	669,154	1,264,177	1,226,322	1,251,365
Mining profit	$1,554,949	$469,894	$218,464	$665,251	$300,786	$242,451
Const. and other charges	43,373	38,841	94,625	8,815	31,280	54,368
Net profit	$1,511,576	$431,053	$123,839	$656,436	$269,506	$188,083
Dividends	600,000	100,000	500,000	350,000	175,000	200,000
Surplus for year	$911,576	$331,053	*$36,161	$987,316	$590,881	$496,374

* Deficit.

Capital Stock: Outstanding, $2,500,000; par $25. Transfer Agent: American Trust Co., Boston. Registrar: Boston Safe Deposit & Trust Co. Listed on Boston and Detroit Stock Exchanges. Dividends have been paid as follows: 1906, $5 per share; 1907, $9; 1908, $2.50; 1909, $3; 1910, $2; 1911, $1.75; 1912, $3.50; 1913, $5; 1914, $1; 1915, $6 per share. Payments semi-annually, F. and A. 1.

NEW JERSEY ZINC COMPANY

History: Incorporated Oct. 30, 1880, in New Jersey, as the New Jersey Zinc & Iron Co. Name changed to present title and capital increased from $3,000,000 to present amount in 1897. Mines located at Franklin Furnace, N. J. Company owns a controlling interest in the New Jersey Zinc Co. (of Pa.), operating plants at Palmerton, Pa.

Business: Manufactures oxide of zinc, spelter, spiegeleisen, sulphuric acid and lithophone.

Management: OFFICERS: Edgar Palmer, Pres.; A. P. Cobb, Vice-Pres.; J. E. Hayes, Jr., Vice-Pres. and Gen. Mgr.; C. W. Sexton, Sec.; H. S. Wardner, Treas.; H. G. Clopper, Gen. Sales Mgr.; E. V. Peters, Pur. Agt., New York. DIRECTORS: W. P. Hardenbergh, August Hecksher, T. D. Jones, Edgar Palmer, C. W. Sexton, Edwin S. Marston, Edwin M. Squier, S. P. Wetherill, John J. Riker, Chas. W. Cox. MAIN OFFICE: Newark, N. J. NEW YORK OFFICE: 55 Wall St. ANNUAL MEETING: Last Wednesday in February, at Newark, N. J.

Earnings: For three months ending March 31, 1916: Net profits (after depreciation), $8,561,385; bond interest, $40,000; reserve to retire bonds, $75,000; dividends (19%), $6,650,000; surplus, $1,796,385.

Bonded Debt: $4,000,000 New Jersey Zinc Co. 1st 4s. Dated Oct. 1, 1901; due Oct. 1, 1926. Interest paid A. and O. 1 at company's office, 55 Wall St., New York. Coupon, $1,000. Principal may be registered. Farmers' Loan & Trust Co., New York, Trustee. Secured upon all the real estate of the company, and all of its mines, minerals, mining rights, buildings, machinery, fixtures, franchises, good will now owned or hereafter acquired, and all of the capital stock now owned in the New Jersey Zinc Co. (of Pa.), the Mineral Point Zinc Co., and the Empire Zinc Co., and all the capital stock of any other corporation or corporations which may hereafter be purchased by the company. Authorized, $10,000,000.

Capital Stock: Authorized and issued, $35,000,000; par $100. Stock transferred at 55 Wall St., New York. Regular dividends at rate of 20% per annum were paid quarterly, February 1, to end of 1915, and in addition in recent years extra (cash) dividends have been paid as follows: January, 1907, 5%; January 1, 1908, 1909, 1910 and 1911, 10% each; January, July and December, 1912, 10% each; Jan. 1916, 10%; Feb., 1916, 4%; April, 1916, 10%; May, 1916, 9%; June, 1916, 5%. In July, 1915, increased capital stock from $10,000,000 to $35,000,000 by payment of a 250% stock dividend. Current rate on increased stock is 4% quarterly.

NORTH STAR MINES COMPANY

History: Incorporated April 10, 1899, in New Jersey; successor to North Star Mining Company, incorporated in California in 1884. The company owns the North Star and other gold mines and mining claims at Grass Valley, Cal., with pipe lines and water property.

Management: OFFICERS: Geo. B. Agnew, Pres.; Sidney M. Colgate, Vice-Pres.; W. D. Pagan, Sec. and Treas. DIRECTORS: G. B. Agnew, James Douglas, William Hague, Wm. C. Osborn, New York; Sidney M. Colgate, Orange, N. J. ANNUAL MEETING: Second Wednesday in April, at Jersey City, N. J. OFFICE: 22 William St., New York.

Comparative Income Account, Years Ended Dec. 31

	1915	1914	1913	1912	1911	1910
Gross income	$1,295,084	$1,416,690	$1,324,275	$1,072,374	$1,025,088	$1,232,934
Other income	40,086	39,547	35,757	37,200	42,273	44,631
Total income	$1,335,170	$1,456,237	$1,360,032	$1,109,574	$1,067,361	$1,277,565
Other expenses	875,954	582,338	551,998	591,253	602,852	555,860
Betterments	285,830	220,296	499,809	*229,717	*166,321	60,050
Net income	$173,386	$553,602	$308,225	$288,604	$298,188	$661,655
Dividends	250,000	450,000	300,051	300,000	425,000	575,000
Surplus for year	(def.) $76,614	$103,603	$8,174	(def.) $11,396	(def.) $126,812	$86,655

* Includes Champion Mines option account, $216,892 in 1912 and $154,701 in 1911.

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A Monthly Magazine published by The New Jersey Zinc Company.
55 Wall Street, New York

EDITORIAL STAFF

EDITOR
THOMAS T. READ

Palmerton
C. S. TREWIN

Franklin
H. D. PETERS

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Introduction

This is the initial number of ZINC, a magazine published in the interest of the operating staff of The New Jersey Zinc Company. Appearing in a day when the news stands appear to be submerged by an avalanche of publications, a new magazine must have a good reason to justify its existence; ZINC is fortunate in that it has not one alone, but several. The zinc industry is one of many phases and information of current interest may be drawn from widely scattered sources. No little labor is involved in collecting and sifting this information and it is an economic waste for each member of the operating staff to attempt to perform so much of this as he may find means and opportunity for doing. The obvious course to follow is to have the work thoroughly done by a central bureau and the results made available to all. A beginning has been made in this issue in the pages headed 'Peptonized Technology', in which a method devised by Mr. Edward Walker and so well applied in the *Mining Magazine*, of London, is slightly modified and restricted to the field of the zinc industry. There is almost an infinite variety of material to choose from and no doubt each reader may feel that he could have made a better selection to meet his own needs. Our duty will be to select that which, on the average, most satisfactorily meets the needs of all. To that end we beg for your editorial co-operation, gentle reader. A sheet of paper, prepared ready for your hand, is enclosed with each copy, and we will be glad to have any suggestion, comment, or criticism you may care to make.

Passing lightly over obvious utilities, such as the furnishing of a medium for the dissemination of company notices that would otherwise need to be included in a multitude of letters, we come to the real *raison d'être* of ZINC,—the creating of a bond of fellowship. We are a widely scattered organization, and the men in the same plant, or office, even, are busy and have but little opportunity for that friendly informal contact which permits men to look behind the curtain of business and perceive the real man within. A winter's night, a pipe, perhaps a glass, a comfortable chair before a good fire, and some good fellows gathered about; these are the elements that most conduce to the finding of just what sort of a man the other fellow is. It would be pleasant if we could follow this method, but it is obviously impracticable. Failing that the best we can do seems to be to create a monthly magazine into which each one of us can put something of himself and see something of the other fellow. It would have been better for the operating staff to have come together and created its own magazine, but such a method of procedure presents many difficulties and it seemed best for the New York office to take the initiative. But this in no sense indicates that ZINC is to be a machine-made thing ground out in the New York office of the company. It is *your* magazine; we have merely built the fireplace, lighted the fire and drawn up the chairs, unless you come and occupy them, joining in the friendly chat, this labor will have been in vain. The issue before you is, therefore, only a tentative beginning, and no apology need be offered for its deficiencies. It is not a finished thing, it is only an evidence of things hoped for,—a tool for you to make use of according to your needs. If ZINC eventually enlists in its making the continued interest and cooperation of all the operating staff it will be a great success. If each performs his part the net result will be much to the benefit of everyone. Gentlemen all, I yield to your hands your paper.

Thomas Read

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55 Wall Street, New York

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THOMAS T. READ, *Editor*

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W. O. BORCHERDT	H. D. PETERS	W. F. BOERICKE	C. S. TREWIN

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Personal Mention

AUGUST HECKSCHER has recently returned from a visit to Augusta, Ga.

GEO. C. STONE, chief metallurgist, recently visited the plant at Depue, Ill.

J. T. PRICE, Prime Western Spelter Co., has been in New York for a few days.

W. P. SUTPHEN, assistant treasurer, has recently returned from a trip to Denver.

EDGAR PALMER has recently returned from a short stay at Jekyl Island, Georgia.

B. F. TILLSON, of Franklin, has been to Nassau, Bahama Islands, on a vacation trip.

J. E. HAYES, JR. vice-president and general manager, has visited St. Louis recently on business.

B. F. HOSKINS, Mineral Point Zinc Co., has been in California for a short stay visiting relatives.

C. W. SEXTON, secretary, has gone to Bonita, California, to recuperate from his recent illness.

E. W. KEITH, of the Ore department, has been in New York for a few days in connection with western ore matters.

A. D. TERRELL, general manager of the Mineral Point Zinc Co., visited New York and Palmerton recently.

ALFRED W. DODD is now eastern sales agent for the Granby Mining & Smelting, with offices at 165 Broadway, New York.

L. D. WILLIAMS, purchasing agent, Chicago, has assumed also the duties of sales manager. J. MATTHIAS is assistant sales manager.

MESSRS. BROOKS and NITCHIE, of the Depue plant, have recently returned from a visit to the electrolytic plants of the northwest.

A. B. SCHULTZ, associate counsel, has recently returned from a business trip to Georgia in connection with some deposits of barytes.

G. M. GARLOCK, of the Tulsa Fuel and Mfg. Co., has returned to Collinsville from Washington, where he has been in connection with gas matters.

E. V. PETERS, assistant general sales manager, and HENRY HARDENBERGH, general purchasing agent, have recently returned from a trip to Chicago.

F. N. SPENCER, late of the Leonard Construction Company, has taken up the duties of assistant to the general manager of the New Jersey Zinc Company.

A. H. PECK, formerly sales manager of the Mineral Point Zinc Company, Chicago, has taken up the duties of sales manager of the New Jersey Zinc Company, with headquarters in New York.

J. E. HAYES, JR. vice-president and general manager, and A. B. SCHULTZ, associate counsel, recently attended a dinner at Palmerton to the Town Council and School Board. J. A. Singmaster, general superintendent, presided.

GILBERT RIGG, chief of the research department at Palmerton, has resigned to take a position in Australia. Mr. Rigg, being a subject of Great Britain, feels it his duty to go to Australia and do what he can to assist the cause of the Allies.

J. E. HAYES, JR. vice-president and general manager, and A. D. TERRELL, general manager Mineral Point Zinc Company, recently inspected the plants at Iola, Kansas and Collinsville, Oklahoma. They were also in consultation with H. B. Talley, counsel, at Tulsa, Oklahoma.

H. S. WARDNER, treasurer, attended a conference of officers of industrial corporations operating in Pennsylvania on March 23. The conference was called by Gov. Brumbaugh of Penn. and had for its object the discussion of ways and means of decreasing the number of accidents to industrial workers in the State.

H. G. HIXON, general superintendent of the Prime Western Spelter Co., Iola, Kansas, has been appointed as the Kansas member to represent the American Institute of Mining Engineers on the joint advisory committee of the five national Engineering Societies to the Naval Consulting Board.

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J. R. RILLEY	H. D. PETERS	W. F. BOERICKE	J. W. HEYLMUN
Mineral Point, Wis.	**Palmerton, Pa.**	**Silver City, N. Mex.**	
W. R. SMITH	W. G. QUICK	W. G. RAMLOW	

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Remarks Around the Fire Place

THANK YOU, WE WILL

To the Editor: News of the Cleveland Camp for the magazine has been getting scarce lately so our local editor thought best to make some news, but since the event happened he seems to be reluctant to send in the data for publication. We are proud of our local correspondent and hope you will give his marriage a prominent place in ZINC.

W. G. Ramlow and Miss Pearl Glaum, of St. Paul, Minn., were married at noon, April 18th, 1917, at St. Paul, Minnesota. On their arrival at the mine the newly-weds were treated, or mistreated, to a genuine Mexican Bandit raid. The groom was kidnapped and placed under heavy guard in the Cleveland lockup. He was later released after paying a ransom of several boxes of cigars. In the evening the couple were the target of a big chivaree or bombardment, the noise equalling that of an offensive on the French front.

Mr. and Mrs. Ramlow have about recovered from the shock of their arrival at the Cleveland and are now at home to their many friends. Come around and get your cigar.

ROY F. SMITH,

May 7, 1917. Silver City, N. Mex.

Iola Makes an Endurance Record

An item published in the *Engineering and Mining Journal* for March 31, 1917, comments at length at the record made by block C, of 600 retorts, on the Cherryvale works of the Edgar Zinc Co. which was put in full charge March 12, 1907, and has been in operation ever since, except in being in dead-fire for 30 days at various periods. The *Journal* says that this record is phenomenal and surpasses anything else whereof we know." Through the courtesy of Mr. Hixon we are enabled to publish the following records made by two blocks at Iola. It will be noticed that block No. 4 surpassed the Cherryvale record by a year, and that Block No. 1 has surpassed it by three years and is still in operation. The *Journal* confers great credit on the manager of the Cherryvale plant and it is evident therefore that Mr. Hixon is entitled to a *magna cum laude*.

RECORD OF CONTINUOUS OPERATION BLOCKS NO. 1 AND 3, PLANT NO. 3, PRIME WESTERN SPELTER CO., IOLA, KANSAS.

Block	Period of Operation	Ore Charged lb.	Zinc %	Zinc Content lb.	Metal Made, lb.	Rec'y %	Yield %
1	Oct. 6, 1904 to April, 1917	153,705,636	37.08	56,996,462	47,889,197	84.02	31.16
4	June 12, 1904 to July 1, 1915	123,571,528	37.99	46,938,719	39,339,443	83.81	31.84

NOTE: During the time mentioned above, Block No. 1 for various reasons was dead-fired twenty-seven days. Block No. 4 forty-six days. Block No. 1 is still in operation.

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A. J. HIESTER	C. C. NITCHIE	M. M. DOLAN	W. F. BOERICKE
Iola, Kan.	Mineral Point, Wis.	Palmerton, Pa.	Silver City, N. Mex.
J. W. HEYLMUN	W. R. SMITH	W. G. QUICK	W. G. RAMLOW

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but a fractional per cent of the cost. Surprisingly accurate guesses at the zinc contents can be made by those experienced in this sort of work, but serious mistakes in judgment will be made at times. It has been my experience that where the cuttings are comparatively free from marcasite, it is much easier to estimate the zinc essay, where the marcasite or "sulphur" as it is called is very heavy, the jack is often disguised and the cuttings are estimated too low. On the other hand, cuttings with coarse, showy pieces of jack invariably are overestimated, and the assays are frequently a hard blow to confident hopes of a new diggings. Finely ground cuttings showing "jack" are in most cases underestimated, especially where the jack is "resin" and unless assayed are apt to be dismissed as "mines." A small high powered microscope is essential to form even an approximate idea of the value of "rosin jack" cuttings. Lead in cuttings, being very easily discovered, is usually overestimated.

Drilling has its primary object as a cheap and fairly effective method of prospecting the ground. The holes have a secondary use, if an ore deposit is found, in adding ventilation in the mine, as well as providing outlets for pipes, wires, etc. in special cases.

Zinc Notes

Cleveland

Frank Andrews, warehouse man, arrived here from California about the middle of November. Mr. Andrews is an experienced man, having held similar positions in Cuba and California in addition to being formerly connected with this property.

E. E. Schwegler, of Denver, and Mr. Smith, of the New York accounting department arrived at the Cleveland mine at the end of November to audit the accounts.

Chas. Bargler, of Leadville, arrived November 23.

Iola

H. G. Hixon was in Iola December 5 looking over the plants. He left for Collinsville the following day.

F. H. Sauer, supply agent at Iola, spent Thanksgiving in Chicago, returning December 2.

W. O. Lenhart returned to Iola December 5 from Ft. Sill, Oklahoma, where he had been stationed for the past three months. Mr. Lenhart was given his discharge from the Machine Gun Company, 137th Infantry, a local organization on account of a bad knee, which kept him in the hospital most of the time during his stay at the camp.

G. M. Garlock, of the fuel department, was in Iola December 17 and Collinsville the following day.

J. T. Price left for Collinsville December 20.

Chester Skinner of the Depue plant, was a visitor in Iola December 15 and 19.

Block No. 1, at works No. 3, Iola, was shut down November 30. The experimental furnaces have been down since October 6.

Two small wells have been drilled in by the Prime Western Spelter Company within the past two months in the field north of La Harpe, which will add considerably to the available gas supply for the winter.

Franklin

The work of paving the main thoroughfare through the Borough was commenced this spring and an experienced engineer engaged to supervise the construction. It was proposed to use Tarvia as a binder and to lay two courses of blue limestone, to be quarried and crushed by the Borough near the Franklin Pond, and finish with a thin layer of fines. Operations were begun at the junction of Rutherford Avenue (the State Road east of the Borough) near the Franklin Pond. The old crusher proved inadequate and a new one was purchased. When the road had been laid to the

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Denver, Colo. A. J. HIESTER	Depue, Ill. C. C. NITCHIE	Franklin, N. J. M. M. DOLAN	Galena, Ill. W. F. BOERICKE
Iola, Kan. J. W. HEYLMUN	Mineral Point, Wis. W. R. SMITH	Palmerton, Pa. A. CRANKSHAW	Silver City, N. Mex. W. G. RAMLOW

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EPA7-001965

It has been administered by the United States since 1900, and the record of the steps taken to safeguard the health of the inhabitants and to promote order and good government reflect great credit on the administration. The Virgin Islands, recently purchased from Denmark are three tiny islands lying east of Porto Rico and totaling together an area of only 138 square miles. Their population in 1911 was 27,086. In part their value is sentimental, in part strategic and political. Their population has been steadily declining, since their trade is small and the freed negroes who compose the population are of a poor order. They add little to the prestige and power of the United States, but their proximity to Porto Rico and the obvious interest Germany has been taking in the Islands made their acquisition a matter of statesmanship.

Zinc Notes

Canon City

F. F. Joel, who has been in charge of the metallurgical calculations at this plant for several years, and who has acted as local correspondent for ZINC, has been compelled to resign his position on account of ill health.

J. E. Overman, general forman, recently spent some time at Camp Kearney, California, visiting his son, who was formerly employed at this plant. The latter has been in military service for nearly two years, having spent considerable time on the Mexican border with the Colorado National Guard, and is now in an officers' training camp.

J. H. Galley, of the clerical force, is the proud possessor of a recently purchased Chandler "Chummy Roadster."

H. M. George, Chief Chemist, and his staff of assistants, are much pleased with the new laboratory.

Since the completion of the laboratory, L. A. Desjardins, who was its architect, and who had charge of the construction work, is temporarily occupied with other matters for the Canon City plant.

Cleveland

J. H. Haigh, of Denver, visited the Cleveland mine on business April 6.

C. T. Brown and Soren Ringlund were visitors at the Cleveland mine during the latter part of March.

Denver

E. E. Schwegler, of the Denver Accounting Dept., spent most of the month of April on an auditing trip to the Company properties in the Southwest.

W. M. Traver, Jr., formerly Mining Engineer at the Kelly mine has been promoted to the rank of corporal in Company C of the 28th Engineers.

On the afternoon of April 16th, the employees of the Denver Office listened to stirring speeches by Rev. A. H. C. Morse and Judge E. C. Stimson on the subject of the Third Liberty Loan.

John F. Bynon, of the Denver Engineering Department, expects to leave shortly for Southern California where he will enter training in the Hydroplane Service of the U. S. Navy.

W. S. Nicoll, of the Denver Purchasing Department, will leave the latter part of April for Camp Funston, Kansas, where he will enter the National Army.

Mr. R. R. May, of Gilman, Colorado, stopped for a few days in the Denver office during April enroute to Hanover, New Mexico, where he will be located for an indefinite period.

J. T. Boyd, of the Eagle mines, was a Denver visitor the fore part of April.

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Mr. and Mrs. W. C. Nestor and Mr. and Mrs. M. M. Dolan, both girls, via the Hospital.

Twenty-two cases over a wide territory were aided by the Franklin Hospital Auxiliary from June 1st to date according to a report just received. Twelve of these cases were surgical and ten were medical and embraced a variety of afflictions.

One bed fund is maintained by the borough of Franklin, one by Sussex and Wantage combined, and three by the Hospital Auxiliary for patients outside of these districts who need treatment and are unable to pay for it.

The distribution of the funds for the free beds were as follows from June to date: Franklin Hospital Auxiliary Bed, 12; Sussex and Wantage Free Bed, 5; Franklin Borough Free Bed, 5; The following towns were represented in this distribution: Newton, Sussex, Hamburg, Ogdensburg, Milton, Oak Ridge, Branchville, Wantage Township and Franklin.

The dance for the benefit of the Auxiliary which was held last Friday night was well attended, about 150 people being present. Exactly how much money was taken in at the affair has not yet been announced but it is estimated that it will reach around $80.00. Because of the bad weather the dance was given at the Neighborhood House instead of the Vocational School which is some distance away from the center of town.

Galena

The funeral of L. D. Adams was held on Saturday, March 23, and was largely attended by his many friends from here as well as the nearby towns and the mines. The floral pieces were particularly beautiful, and the casket was fairly covered with flowers. The pallbearers were George Baker, Roy Cole, Charles Gillette, E. Claussen, Theo. Polhemus, and W. F. Boericke. Among the honorary pallbearers were Messrs. Thacher, Hoskins, Place, Potter, Stoval, Pincon, Barrett, and Ware. Interment was made in Greenwood Cemetery, Galena.

John Christy, electrician for the Company, was badly shocked when working near the high tension line at the Penna mine, but after a few days layoff, was able to be about again, none the worse for the accident.

Mr. Thacher spent a few days in Galena with Mr. Hoskins.

Iola

The reconstruction of the furnace buildings at Works No. 3 is now completed and all the furnaces are in operation. Block No. 4 was charged on April 5th, Block No. 3 on the 14th and Block No. 2 and the refinery were charged on the 19th. The new buildings are better constructed than they were originally and the plant is in better condition than before the storm.

R. B. Boone, Jr., who has worked in the Iola offices for the past six years will leave soon after the first of May for Portland, Ore., and other points in the north-west where he expects to reside.

P. C. Class, who succeeded F. O. Russell in the Iola offices, has accepted a position with the Lehigh Portland Cement Co., of this city, and is succeeded by L. E. Rogers, of the Gas and Fuel Department.

Marion Dorsett, of Works No. 3, office has accepted a position with the Empire Gas Co., at Eldorado, Kans.

Word received from Howard Lawyer who recently left Iola offices to enlist in the clerical work of the aviation department at Waco, Tex., states he likes his work fine altho he is spending much time in digging trenches and doing other "clerical" work.

H. G. Hixon, of Chicago, and J. D. James, of Palmerton, arrived in Iola April 11th. Mr. James is superintending the operation of the new refinery during its early stages.

Mr. Coursen was in Iola the 12th and 13th of April.

E. B. Heylmun, formerly of the office at Works No. 3, and three other Iola boys were commissioned 2nd Lieutenants April 5th at Camp Doniphan after a strenuous three months course in the Officer's Training School. He is now at Camp Mills, L. I., ready for embarkation to France.

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Filename: 1918-11 Zinc-Plan of Organization of NJZ.pdf

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zinc

A Monthly Magazine Published by The New Jersey Zinc Company

EDITORIAL STAFF

W. H. SHEARMAN, *Editor*

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Iola, Kan. L. E. ROGERS	Mineral Point, Wis. W. R. SMITH	Palmerton, Pa. A. CRANKSHAW	Silver City, N. Mex. C. A. MOORE

Gilman, Colo.
MISS NATALIE MESSEROLE

VOL. III NOVEMBER, 1918. No. 11

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Plan of Organization of The New Jersey Zinc Company*

It has been impossible for me to find time to prepare a formal paper to present at this meeting, but I believe in any event an informal talk, with opportunity for you fellows to ask any questions that occur to you, will lead to a better understanding of our plan of organization and the various duties of the individuals and units going to make up that organization; and that is the real object of my being here today.

Without going into the theory of, or the reasons for forming an organization along the lines we have adopted, I believe I can briefly describe The New Jersey Zinc Company's organization, and any points not clear will be gladly explained if you will interrupt me.

We do not by any means consider our organization a completed or an ideal piece of work. It has been our endeavor to plan an organization to take care of conditions at the time our plans were made, and to have the results so flexible that the necessary changes occuring through the expansion of the company's activities or through changed industrial conditions, can be made without altering the fundamental ideas underlying our plans.

With this understanding I will proceed with an outline of our organization as it exists.

At the top of the organization as we know it, stands our Board of Directors with the President of the company acting as Chairman. The Board of Directors represents the stockholders and is responsible to the latter, for the conduct of our business, the expenditure of moneys, and, in general, for the handling of the interests of the stockholders, so that their investment in our industry will yield them a proper return on such investment. The Board of Directors meets only once a month and consequently, in order to take care of questions arising between these monthly meetings, it has appointed an Executive Committee of four from its membership with the President of the company as chairman; this committee meeting once a week and taking action on all questions needing decisions, such decisions being comfirmed at the next meeting of the Board. In a great many companies the Chairman of the Board of Directors and the President of the company are two distinct offices, and I might cite as a typical example the U. S. Steel Corporation, where Mr. Gary is Chairman of the Board and Mr. Farrell is President. With us the President acts as Chairman of the Board, Chairman of of the Executive Committee and President of the company.

Reporting to the President are two Vice Presidents, one having charge of all departments having to do with finance, the sales of products, accounting, auditing, statistics, real estate and the general agreements and records of the company. The other having charge of all departments having to do with mining, manufacturing, engineering and research, ore and fuel purchasing, and general purchasing.

Each Vice President has a number of men reporting to him, who in general are known as the Heads of the General Departments. In our particular branch of the business the Vice President is known as the Operating Vice President as distinguished from the Financial Vice President. Reporting to the Operating Vice President, the heads of the general departments are known as General Managers of the particular general departments under their jurisdiction. For instance, Mr. Coursen is

* An informal talk to the members of the Technical and Manufacturing Departments by J. E. Hayes at Palmerton, September 19, 1918.

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General Manager of Manufacturing, having charge of all manufacturing; Mr. Singmaster is General Manager of Technical Department, having charge of all engineering and research work; Mr. Van Mater is General Manager of Mines, having charge of all mining work; Mr. Janeway is General Manager of Ore and Fuel, having charge of all ores and fuels for the company operations; Mr. Stone is Chief Metallurgist, acting as a consultant to the Vice President on all metallurgical questions; and Mr. Hardenbergh is General Purchasing Agent, having charge of all purchasing for the company.

In the case of the Purchasing Department and the Chief Metallurgist, which are both general departments, a concession to established custom, causes us to call Mr. Hardenbergh General Purchasing Agent and Mr. Stone Chief Metallurgist instead of standardizing their titles and calling them General Managers.

It has been found that in general it is not good policy to have more than six or seven diversified activities reporting to one man, and here comes in the question of elasticity of our plan of organization. You will note that it is perfectly feasible, should the size of our industry demand it, to have additional vice presidents, to have assistants to the vice presidents, and assistants to the heads of the general departments, and by this means to expand our organization to cover almost any expansion of the company's activities that any one can foresee, and this is a rather broad statement for some of us are dreaming of a vast broadening out and expansion of our business to cover the many branches of the zinc industry which have opened up under the changed conditions in the world of industry.

Reporting to the heads of the general departments are the heads of various groups of units going to make up the structure of The New Jersey Zinc Company's organization. In our end of the business these heads of groups are known as General Superintendents, and their work is further divided up into units such as plants or mines, each having a superintendent whose work is again subdivided into units in charge of foremen, and so on down until the unit becomes incapable of subdivision and we have reached the common laborer.

(Mr. Breyer asks for the names of the members of the Board of Directors and the Executive Committee).

Our Board of Directors is composed of the following gentlemen:

EDGAR PALMER, President of the company.
JOHN J. RIKER,
THOMAS D. JONES,
AUGUST HECKSCHER,
W. P. HARDENBERGH,
EDWIN S. MARSTON,
EDWIN M. SQUIER,
CHARLES W. COX,
A. B. SCHULTZ.

The Executive Committee is composed of the following directors:

EDGAR PALMER,
JOHN J. RIKER,
AUGUST HECKSCHER,
EDWIN M. SQUIER.

(Mr. Singmaster asks for a description of the routines for handling requests for appropriations and general instructions).

Requests for appropriations of money for capital investment have been covered in a routine which has worked very successfully and probably the best way to describe the working of the routine will be to take a typical example. Let us suppose, for instance, that somewhere in our organization the information has been gathered that there is a market for pharmaceutical zinc oxide with a possibility of making a profit for the company by the manufacture and sale of this product. This idea may come from the highest or lowest points in the organization, but eventually it reaches Mr. Singmaster as head of the Technical Department. He applies to the Operating Vice President for an authorization to make certain charges to the Engineering Expense Account and possibly to the General Experimental Account, in order to make plans

EPA7-001970

and estimates for a phamaceutical oxide plant and to do experimental production work to determine the best methods of manufacture, this last in close cooperation with the Manufacturing Department. After the plans and estimates are completed to the satisfaction of the Engineering Department and the Manufacturing Department, the head of the unit where the product is to be made makes a formal request for an appropriation to cover the cost of erection of the plant in question, using the estimate of cost prepared by the Engineering Department and including any expense already authorized for engineering work. This formal request is handed to the head of the general department; in the case under consideration, to Mr. Coursen, as General Manager of Manufacturing, who discusses the project in all its details with the Operating Vice President. The latter being convinced that there is a profit to be made for the company by the manufacture of this product, passes along the request to the Executive Committee with his endorsement and such data as will give them complete information as to why we wish to expend the sum in question, how much profit we can make per year and any other data as to the advisability of the company expending moneys for the purpose suggested. The request is acted on favorably by the Executive Committee and the sum asked for is immediately available for starting the construction of the plant.

I have said the sum asked for is appropriated by the Executive Committee, because it is an almost unknown situation to have our Executive Committee disagree with us as to the advisability of a project, and this is the greatest compliment I can pay you fellows, for they are not a committee of figureheads, ready to approve anything that comes to them, but they have confidence in you—look out when you make a bad "bull", their attitude might change.

I have described this routine in detail as a typical one, and, of course, you understand it applies to all departments as well as to the Manufacturing Departments.

Now, as to our system of General Instructions, which Mr. Singmaster has asked me to describe—I might say at the outset that it is not our intention to have these looked upon as hard and fast rules and regulations for the carrying out of our business or for memorizing by any of the members of the organization. This latter would be a hopeless task, as you can see, when you look at our general instruction files, which are getting to be about the size of a city directory. Our idea in starting this routine was to have some method of disseminating through our entire organization, information or instructions regarding any subject, with certainty that it would automatically reach all those it should reach, without depending on any individual remembering to properly transmit it. A second, and just as important reason for the routine, is to have on file, instructions on general subjects, so as to insure a standard method of handling a recurring subject—a place to turn to when the question arises "how shall this be handled". As an example of the kind of subject covered by general instructions and the method of handling the instructions themselves, let us take the general subject of "traveling expenses". Now, bear in mind that an instruction may originate anywhere in the organization, but it is started on its course by one of the Vice Presidents when he puts it in a general instruction.

Let us suppose that Mr. Kelsey, as superintendent of the Palmerton works, has trouble in handling the question of traveling expenses of some of his men. He formulates his troubles and his ideas as to how to cure them; the latter, it seems, would be applicable to the entire company and an instruction is written in the most general terms possible, covering—the methods employees should adopt when traveling for the company, how such expenses should be reported, what forms are to be used in so reporting, and the allowable expenses for company account. This instruction is issued in the General Instruction Series and is automatically distributed to the Heads of the General Departments. Each of the latter

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automatically reissues the general instruction in his series of Departmental Instructions; it thus reaches the units reporting to him and the head of each unit automatically reissues in the unit's series of instructions; and so on down to the smallest subdivision. It may be stopped at any point in its various courses, because it does not apply lower down, or it may continue until it appears on the plant bulletin board in various languages for the information of the lowest portions of the organization. In the case of our example it would probably stop at the chiefs of departments in the Manufacturing Department, and in the Technical Department would continue to every member of the department.

Some of the subjects covered by general instructions we have always with us, such as traveling expenses. Others are temporary subjects, such as methods of handling claims for exemption on industrial grounds. In order to handle these different kinds of subjects we have two classes of General Instructions, A and B—the former being issued on white paper and the latter on pink. The latter are cancelled as soon as the temporary conditions have ceased to exist; the former stand until superceded or modified by supplement or appendix, and such modifications can be made at any time by issuing a supplement or appendix in the same way the original instruction was issued.

This routine has proved of enormous value to us during the past few years, when it has been necessary frequently to advise the entire organization regarding a new method or a change in some standard method of handling matters.

I have not followed through in detail the branch of the organization reporting to the Financial Vice President as in all essential details it has the same structure as our branch. The heads of the General Departments are known as Secretary, Treasurer, General Sales Manager, Comptroller and General Counsel, instead of General Managers, but the form of organization is the same and all routines and methods prescribed by the general instructions apply in the same way.

(Mr. Singmaster asks why the company operates under various names in different localities).

The New Jersey Zinc Company is the parent company and its lines of organization and routines carry through all the subsidiaries. The reasons for the existence of those subsidiaries will be found in the various State laws governing corporations. I want to impress upon you that there is no subterfuge here—we are not hiding behind some other name with ulterior motives.

Let me again use an example to illustrate. The laws of Pennsylvania do not permit a corporation, incorporated in another State, to own real estate in Pennsylvania—it is therefore necessary for us to form The New Jersey Zinc Company (of Pa.) in order to own the Palmerton Plants; there is no concealment here, the latter company does not make any money, but turns its product over to the parent company at cost. And so will be found a similar reason wherever we operate under another name than that of The New Jersey Zinc Company.

(Mr. Breyer asks for some idea of the company's policy as to expansion, broadening out and the manufacture of new products.)

There are two different kinds of companies in my experience, one where all policies, all growth, all activities, originate at the top, and the organization is a machine which puts those ideas into effect. Another kind, where "the top" on account of long experience becomes a counsellor and guide, a director of effort and energy into the proper channels, a controller of excess enthusiasm and a spur to greater activity. The ideas, the development of those ideas and the opening up of new avenues depend on the organization itself.

We are decidedly of the latter sort—so the best answer I can make to that question is, that it is up to you fellows. Go the limit as long as your activity is related to zinc or the by-products occurring during the operations of mining, milling and smelting it.

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Filename: 1919-01-23 NJZ Pension Dept Rpt.pdf

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THE NEW JERSEY ZINC COMPANY,

55 WALL STREET,

NEW YORK, Jan. 23, 1919.

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Mr. R. M. Catlin, Supt.,
The New Jersey Zinc Company,
Franklin, N. J.

Dear Sir:

We enclose herewith copy of the annual report of the Pension Department for the year 1918. This report also shows the estimated expenditures for the first six months of 1919.

Yours very truly,

T. J. Deane

Supt. of Pensions.

TJD:M
Encl.

EPA7-001973

REPORT OF THE NEW JERSEY ZINC COMPANY

PENSION DEPARTMENT

New York, January 1,1919.

At the beginning of the year 1918 there were 45 pensioners on the pension rolls, receiving an average allowance of $21.90 per month. During the year 3 applicants have been received, all of which have been granted, as follows:

Class B - 1 with monthly allowance of		$18.00
" E - 1 " " " "		25.00
" E - 1 " " " "		15.00

Four pensioners died during the year, with monthly allowance as follows:

2	@	$15.00	per month
1	@	18.00	" "
1	@	30.00	" "

The following table shows the progress of the Pension Department from its inauguration, February 1, 1911 to December 31, 1918.

Year	Number of Pensioners Jan. 1st	Retired Through Year	Total Number of Pensioners	Monthly Payments	Total Amount Paid	Died During Year
Feb. 1911	16	33	49	439	$ 7,486.45	1
1912	48	2	50	583	10,529.40	2
1913	48	3	51	587	14,486.40	3
1914	48	4	52	580	15,612.90	3
1915	49	2	51	602	15,799.40	2
1916	49	6	55	582	15,966.40	7
1917	48	4	52	587	16,611.40	7
1918	45	3	48	552	12,003.40	4
		57			$108,495.75	29

Average Allowance for the Period $24.04

SUMMARY

Total number of Pension Applications considered to December 31,1918 ..92

Number of Pensions Allowed	73	
Deceased	29	
Total Number of Pensioners January 1,1919	44	
Aggregate Annual Allowance to Pensioners now in force		$11,372.40
Average Allowance now in force		21.53

EPA7-001974

The receipts and expenditures for the year ending December 31,1918, were as follows:

Income		
Bank Balance January 1, 1918	1,925.78	
Contributed by Associated Companies	12,000.00	
Interest on Deposits	112.62	14,038.40
Paid Out		
Pension Allowance	12,003.40	
Salaries and Expenses	1,224.87	13,228.27
Bank Balance December 31,1918		810.13

Estimated Requirements
Six Months Ending June 30,1919

For Pension Allowances now in force	5,686.20
Salaries and Expenses	600.00
	6,286.20

It has been thought expedient to call for contributions to the Pension Fund by the Associated Companies to an aggregate amount of $5,800.00 on account of expenses of administration and necessary outlay for pension allowances during the six months ending June 30, 1919.

In accordance with the basis of determining the proportions under the Pension Agreement the amounts to be contributed by the respective companies are as follows:

	Percentage of Whole	Amount
The New Jersey Zinc Company	24.07	1,396.06
The New Jersey Zinc Company (of Pa.)	38.95	2,259.10
Mineral Point Zinc Company	17.96	1,041.68
The Bertha Mineral Company	2.59	150.22
The Empire Zinc Company (of Colo.)	7.55	437.90
Prime Western Spelter Company	3.33	193.14
Tulsa Fuel and Manufacturing Company	4.25	246.50
Empire Zinc Company (of Mo.)	.05	2.90
The Palmer Land Company	.74	42.92
Palmer Water Company	.14	8.12
Chestnut Ridge Railway Company	.37	21.46
	100.00	$5,800.00

By Order of the Pension Board,
A. P. Cobb,
Secretary of Pension Board

EPA7-001975

Rutgers

New Jersey Zinc Company

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A Monthly Magazine Published by The New Jersey Zinc Company

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Palmerton, Pa. A. CRANKSHAW
Silver City, N. Mex. C. A. MOORE
Tiltonville, Ohio F. O. RUSSELL

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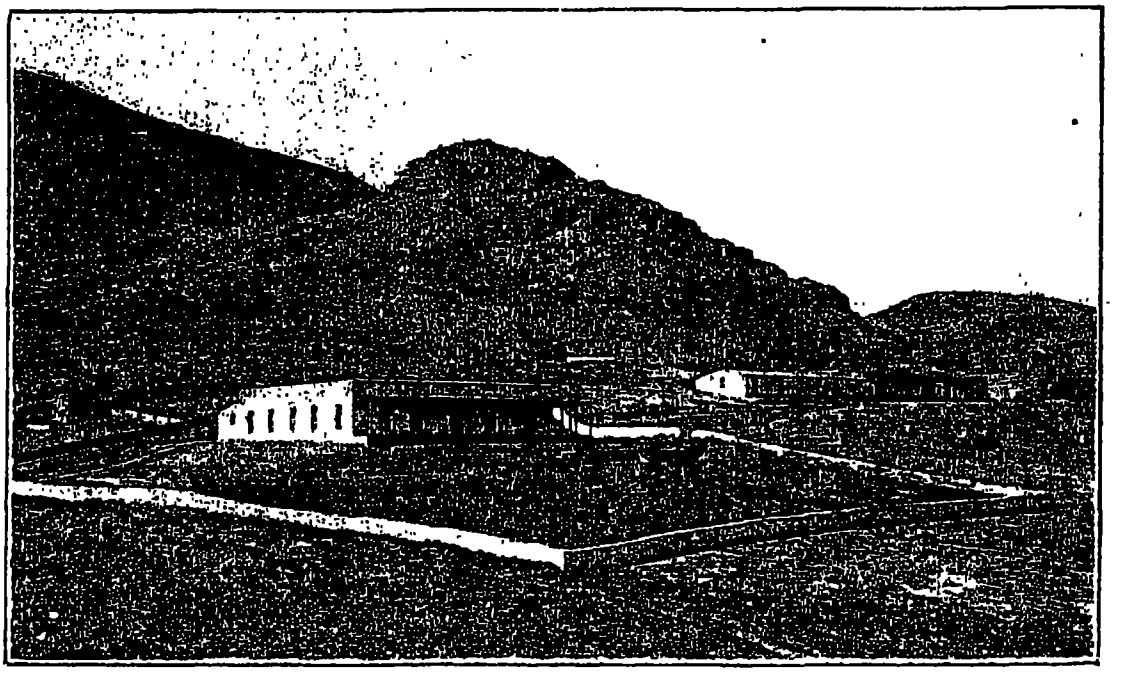
The Activities of The New Jersey Zinc Company in Mexico and Western United States*

The company first became interested in Mexico from an ore-buying standpoint. Oxidized Mexican Zinc ores were first shipped to the Iola plant in 1905 with good results. Our office at Monterey, the capitol of the State of Nuevo Leon, was opened in 1906. Northern Mexico is rich in oxidized zinc ores. In the early days the grade of these ores was very high, shipments assaying 40 to 50% zinc. As mining operations continued the grade became lower. Present average is about 35% zinc. The Monterey office was also opened with the idea of examining, purchasing, and operating zinc mines in Mexico. Even during the revolutionary periods this office was never closed and is at present purchasing ores for our plants in this country, as well as directing the operations of one of our Mexican mines.

The Mexican mine owners were at first suspicious of American ore buyers. At first they insisted upon ore settlements based on Mexican shipping point weights and samples. For this reason we at the start employed in Mexico from two to four Mexican samplers. When ore was ready to ship, a sampler was sent to the shipping point, and with the owner of the ore, or his representative, supervised the weighing, sampling and loading of the ore.



La Bufa Mine, Charcas, San Luis Potosi, Mexico

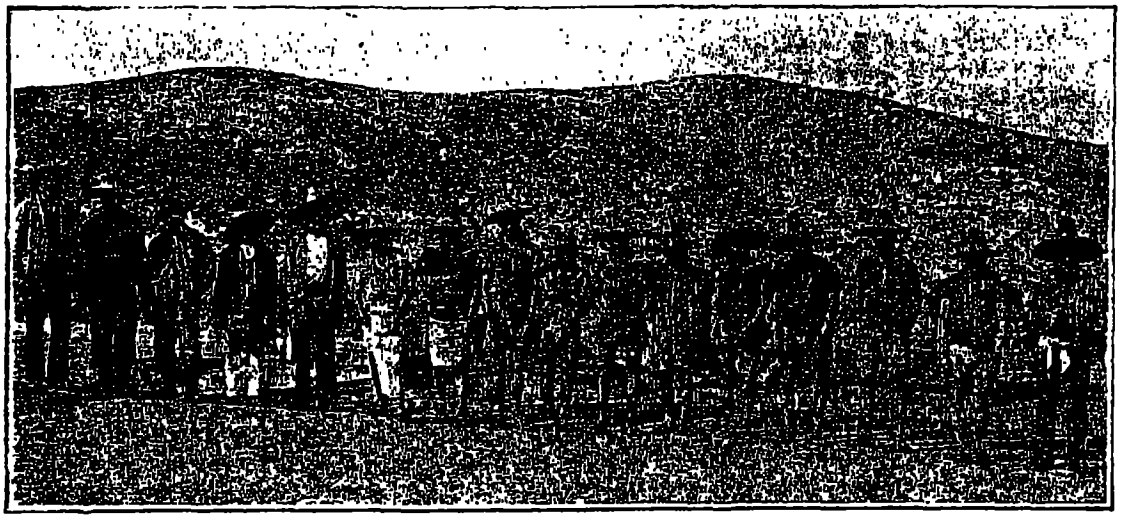
* A talk by Robert Hursh, Asst. Secretary and Asst. Treasurer of The Empire Zinc Co., to the members of the Technical and Manufacturing Departments at Palmerton.

EPA7-001978

Sampling at Mexican railway stations was crude, being conducted on a piece of canvas, or a rough wooden platform, or on the floor of the railroad car, or even on the ground. Every tenth sack, wheelbarrow, or shovel, was taken as the car was loaded. The ten percent sample thus obtained was cut down by coning and quartering. The ore was weighed in sacks or wheelbarrows on small platform scales. These samples and weights were the basis for payment, which was very often made in full before the cars even reached the American border.

sons of averages of shipping point samples with smelter samples, giving the shipper his choice between the two for trial lots and then gradually getting him to consent in advance to accept the smelter results.

The point was not reached where we could insist upon smelter results as basis for payments until the revolution broke out, which made transportation bad, eliminated some competition for ore and made communications between Monterey and various mining districts very poor. It became impossible to send samplers to shipping



Typical Day Shift at La Bufa Mine

Left to right: bookkeeper, shift boss, hoisting engineer, four underground muckers, eight miners and top man

Under such arrangements our smelters took great chances in spite of our best efforts to protect them. Smelter assays were sometimes lower and sometimes higher than those obtained from shipping point samples. Over a period of time, however, the two assays checked very closely. We took these risks to get the confidence and good will of the Mexican miners by first complying with their desires without protest. Gradually we succeeded in convincing them, one by one, that our smelters were honest and had better facilities for accurate weighing and sampling than were available at Mexican shipping points. This was accomplished by argument and by continued comparipoints. There was nothing to do but ship the ore and accept smelter returns. We now buy all ore in Mexico only on the basis of smelter weights and assays. I am glad to state that the Mexican producers actually have confidence in our results even though our smelters are in another country miles away, and the owners of the ore usually cannot personally, or by representatives, witness the weighing and sampling.

It seems to me quite important to mention, that when a representative of the Empire Zinc Company makes an ore contract, he practically guarantees that the ore will be sampled, weighed and assayed accurately at our smelters. It, therefore, follows that you men at

EPA7-001979

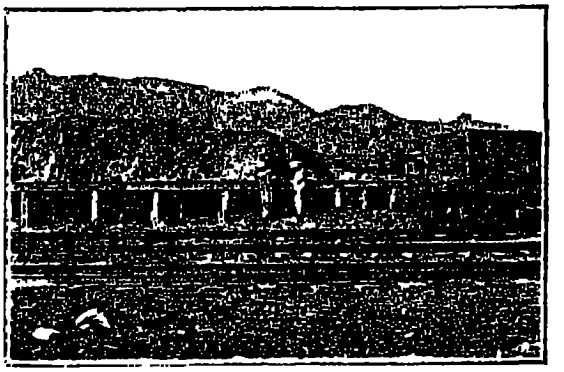
Palmerton are in reality a party to these contracts, as those of us who buy the ores have no direct control over weighing and sampling. I wish to point out your responsibility in this connection, and to emphasize how im-

Company Buildings at Penascosa Mine, near Monclova, Coahuila, Mexico

portant it is for you to assist us in maintaining the good name of the whole New Jersey Zinc Company by being very sure, through personal attention, that the weighing, sampling and assaying is accurately performed.

You may be interested in knowing how shipments of Mexican ores are handled. We employ brokers at El Paso, Eagle Pass, and Laredo, Texas, which are the American border points through which the ores enter this country. The ores are assigned, freight collect, to The Empire Zinc Company care of the brokers at these ports. The ore is transferred from Mexican to American cars at the border. It is bought f.o.b. American cars to American border points, with all expenses to said points for account shipper. These expenses, consisting of freights, transfer charges, fumigation, custom house entries, Mexican duties, brokerage, etc., are paid by our brokers with our funds, and payments thus made are deducted by us from liquidations with the shippers. In early days we were forced to buy these ores f.o.b. Mexican shipping points, the entire risk of all expenses from Mexican shipping points to smelter being ours. Today the Mexican miner takes all the risk and pays all of the expense for delivering the ore to us on the American side of the border. Our brokers reconsign the ores from the American border points to our various smelters as we direct. The smelters liquidate the railroad freights from American border points and pay the American duties of which the zinc duty is for our account, and the lead duty, if any is charged back to the shipper.

With regard to payment for the ore. When a car of ore reaches the American border point, our broker wires the Denver office, giving name of ore and car number. In the meantime we have received at Denver from the shipper his estimate of the weight and the grade of each car shipped. The day we receive a telegram from the broker that a car is at the American border point, we mail the shipper our check for 75% of the estimated value of the ore, based on the weights and grades with which he has furnished us. We trust him absolutely to give us, at least approximately, correct weights and grades, and accept his statement of same without question for the 75% advance payment. We then adjust the balance of 25% on the basis of smelter weights and assays at the time they are received. It is a case of fair-



Penascosa Ore Shipping Platform at Fierro Station

play between buyer and seller, and to date we have suffered no losses, which is, I think, rather a surprising record and speaks well for both parties. You must remember, however, that the seller has full control over the mining

EPA7-001980

and shipping of his ores, while the ore buyer who makes the contract has only indirect control over the handling of the ores at the smelters. We trust you, however, to take good care of this end.

At present the Mexican ores are going to Collinsville and Palmerton plants. Those of us who buy it like to be kept informed of the kind of ore the smelters want, how they desire to use it, and the results they obtain in the use of the different ores. This information is of equal importance to the man who buys the ore as it is to the man who smelts it. The ore buyer wishes to serve the smelters by giving them the ores they can use to best advantage. He has no prejudices as to where the ores come from, or who he buys them from. It, therefore, follows in my judgment the co-operation between those of us who buy the ores, and those of us who smelt them, is essential, and in order that we may co-operate we should, I think, become better acquainted and become familiar with our respective operations and difficulties in order that we can best serve each other and get results for the entire company.

You may be interested in knowing something about our mining operations in Mexico. Our first property was the LaBufa mine, located in the Charcas district, State of San Luis Potosi, Mexico. The deposit as purchased was a low grade silicate ore, opened up fairly well on the surface. Shipments, assaying about 27% zinc and no lead, were made to the Iola, Palmerton and Mineral Point plants. The grade was low and the freights high. The excessive American zinc duty established by the Payne tariff made shipments of this ore prohibitive beginning 1909. We then turned our attention to developing the property. A vertical shaft five feet by ten feet was sunk to a depth of about 850 feet and various cross-cuts were driven from it. We discovered that oxidized silicate zinc ore changed with depth to a low grade sulphide zinc ore, averaging about 12% zinc. We hope this material can be successfully concentrated. The Mexican Revolution caused a suspension of operations. Some day we hope to be able to resume them. In the meantime the mine is idle, full of water, and in the hands of Mexican watchmen, while the Monterey office is paying the mine taxes in order to maintain our title to the property.

We own the Morelos mine, also in the Charcas district and near the La Bufa mine. It is a sulphide deposit pretty well opened up by former owners and assaying 15 to 20% zinc with some little copper, lead and silver. It is a concentrating proposition, bought with the idea that it could some day

Railroad Train Captured and Set on Fire by Mexican Bandits

be profitably operated. To date we have not operated this property, but are simply holding it for the future.

We also own the Santa Eulalia Mine, which is in the Charcas district and near the LaBufa and Morelos properties. The Santa Eulalia is a prospect, containing good possibilities of a considerable tonnage of low grade milling sulphide zinc ore. It was purchased with the intention of some day developing it. To date we have not operated it, but are holding it for the future.

Near Monclova in the State of Coahuila, Mexico, we purchased a small deposit of oxidized zinc ore known as the Penascosa Mine. After mining and shipping some 2000 tons of 40% oxidized zinc ore, this class of ore practically pinched out, but fortunately we found some lead-silver

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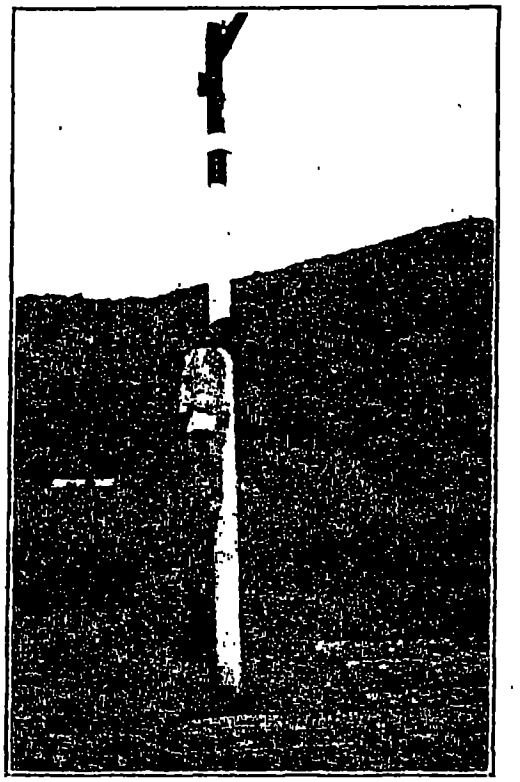
ore. We continued operations, selling this lead-silver ore to the A. S. & R. Smelters at Monterey. Operations were discontinued during the worst part of the revolution. They have since been resumed and the mine is now in operation, shipping lead-silver ore to Monterey and an occasional car of 35% oxidized zinc ore to our Collinsville plant. The lead ore assays approximately 12% lead, 23 ozs. silver, 13% zinc, 50% silica, 3% iron and 3% lime. This ore you will see is low grade, particularly considering the zinc and silica content for which we are penalized. It is not a large mine, but operations have been profitable.

In the State of Sonora, Mexico we purchased what was originally a lead-silver mine called Batamote. It contains high grade sulphide zinc ore. There was enough of this ore on the dump ready for shipment to warrant the purchase, and the mine itself has possibilities. Conditions have never been favorable for operating this property. Some day we hope to do so to advantage.

The Mexicans give little trouble as laborers, and for hand work they are remarkably good miners. They are not as worthless, lazy, and treacherous as is sometimes stated. We have had good success with Mexican labor, not only in old Mexico, but also in new Mexico.

The bulk of the Mexican people are uneducated. To show the ignorance of the common people and to give you some idea of why the revolutionary disturbances have been possible, I will tell the following story: When Francisco Madero was running for President of Mexico, he made a speech at Guadalajara and the crowds in the streets shouted "long live Madero and long live democracy." It is reported that one of the Mexican peons said to another, "we know Madero, but who is this democracy." Even though this may not be a true story, it illustrates the fact that the masses in Mexico are illiterate, for which they are to be pitied and helped rather than blamed.

Mexico will, I think, after the European war pocket most of her pride and any feeling against the foreigners, and will request assistance, particularly financially. Some country must help Mexico. In my judgment our country rather than any other should make an



What happened to the bandit that was captured by the Federal soldiers who arrived after the freight train had been destroyed

honest intelligent effort in that direction.

Mexico is a wonderful country of very great natural resources. It has ores of all kinds and the largest oil fields in the world. Among other important products are coffee, sugar, wheat, corn, cattle, sheep, horses, cotton, wool and rubber. Mexico needs further scientific development. Water power must be transformed into electrical power. Farming methods must be improved. Irrigation projects car-

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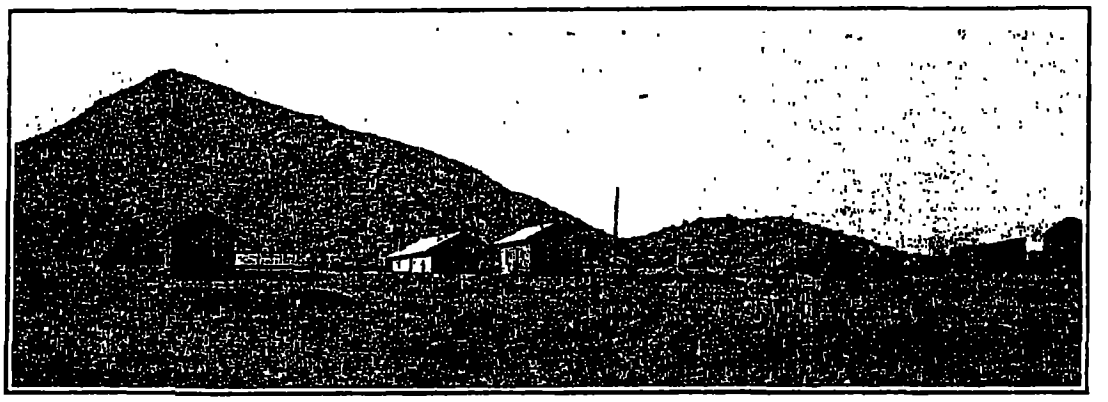
ried out. Low grade ores mined, concentrated and smelted. New rail-roads built. Mexico offers great opportunities to the capitalist and the engineer once its government is stable, which is bound to eventually come about. Our company has interests in Mexico and a reputation there that must survive. We need Mexican ore now, and may need more of it in the future. We should, I think, do our part to help Mexico and to maintain our already successful business there.

Our interests in Western United States are becoming quite extensive. The company started in the West about 1899 or 1900, when Mr. Troutman went to look the country over from both an ore and mining standpoint. Among other things he found large amounts of milling sulphide zinc ore at Leadville, Colorado in the mines and in the old dumps. A magnetic mill was built at Canon City about 1902 to treat these ores. The zinc was magnetic and Wetherill magnets pulled it away from the iron gangue, making a satisfactory zinc concentrate. The mill was a success and was gradually enlarged. The magnetic zinc sulphide ores of Leadville were eventually pretty much exhausted, therefore, roasters were then installed at the Canon City mill so it could treat the non-magnetic sulphide ore of Leadville by roasting them, and then pulling the roasted iron from the zinc by the Wetherill magnets. This opened a new field for The Canon City plant, which is operating today on the non-magnetic sulphide ores of Leadville. When the zinc products produced by the magnets contain lead in quantity, they are treated in a wet table mill in order to separate the zinc and lead.

We do not buy ores for Canon City mill simply on analysis. Two ores may analyze the same, but act quite differently in the mill, so we have a testing plant at Canon City. 100 lb. samples of respective ores are sent there and complete tests made. The result of the tests come to the Ore department, as well as the Milling and Mining departments. If the test is satisfactory a price based on it is offered for a small tonnage, and if the commercial mill duplicates a test as is almost invariably the case, a contract for the ore is made.



San Xavier Mine, Arizona

The testing plant is also used to check the commercial mill and prove as to whether or not it is operating to the best advantage. It is also sort of a pilot for the commercial mill, as we never put ore in the commercial mill until we know from testing plant results how we think it should be treated. I know of no other plant that works quite on this careful basis both from an ore-buying and operating standpoint.

The Canon City Testing plant is also used to test ores from mines that we have examined and are perhaps considering purchasing. If such mines are pur-

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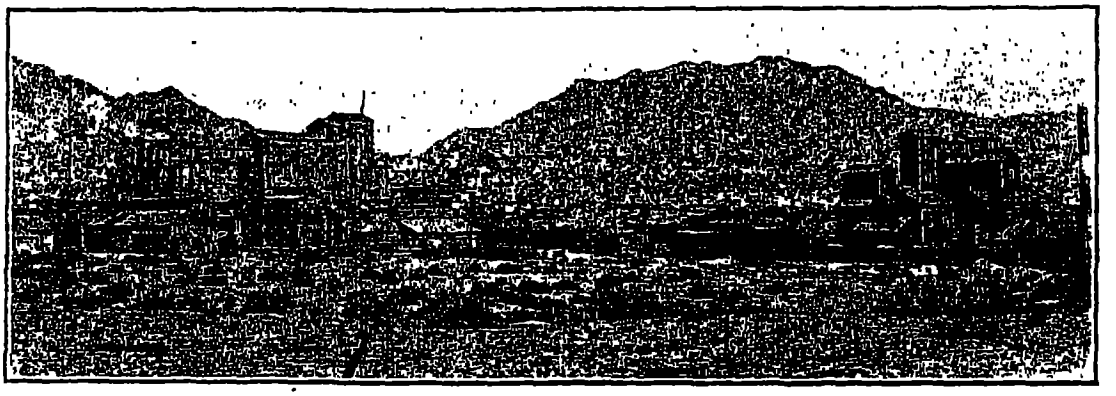
chased or if in mines we already own we find sulphide milling ores and develop enough of these ores to warrant a mill, we then send representative samples of the ores to the Canon City testing plant and on the basis of tests made there, commercial mills are built at the mines. Mills at our Cleveland and Hanover mines were built on the basis of tests made at Canon City.

The mill superintendent and the head of the testing plant work hand in hand under the direction of the Mining and Milling departments. The Ore department co-operates with them and is familiar with their operations



Canon City Mill and Testing Plant

in order to puchase for them ores which actual tests prove will be satisfactory. This mill has operated uninterruptedly since its erection, except for a few months during the panic of 1907. It has been a profitable operation, treating purchased ores to a great extent with the exception of ores that have been treated from our Colonel Sellers and Eagle Mines.

In Leadville the company first purchased the famous Colonel Sellers Mine. For several years operations were confined to shipping the low grade zinc sulphide or dump to the Canon City mill. The mine was afterwards equipped and operated. The problem was to recover all the ore and do it cheaply. Heavy square set timbers were necessary as the ground was hard to hold. By good mining work the deposit was eventually exhausted after several years of very profitable operations. The ore deposit was sulphide zinc with iron gangue and also straight iron pyrites. The Canon City mill treated the zinc except a small tonnage of high grade crude sulphide ore that went direct to our smelters. The iron sulphide ore was sold to the lead smelters.

A few years ago the company purchased the Small Hopes Mine in the Leadville district. This is a low grade zinc sulphide ore with iron gangue. The mine also contains iron sulphide ore. Operations were started but labor difficulties caused a suspension. The property is now idle.

Some thirty miles west of Leadville over Tennessee Pass and right at the town of Red Cliff on the Rio Grande Railroad, is Battle Mountain, on top of which is the mining town of Gilman. We have gradually acquired practically all the known sulphide zinc properties on Battle Mountain. These are being worked as one large property known as the Eagle Mines. The deposits are largely zinc iron sulphide of varying zinc content, but the great bulk of the deposit is milling ore. Some clean iron sulphide containing silver, some low grade zinc carbonate and some low grade manganese ore are also found. Eagle deposits are very large. We think they constitute a large property that will last for many years.

The Rio Grande as it goes westward from Red Cliff runs through the narrow Eagle Canon through which flows

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the Eagle River, and on one side of which is Battle Mountain. Crowded in this canon right at the base of Battle Mountain and right along side of the railroad is the Eagle Mill. It has a present capacity of approximately 5,000 tons of ore per month and cannot be enlarged due absolutely to lack of room. The Newhouse Tunnel at the Eagle Mines comes out to the surface on Battle Mountain at the top of the Eagle Mill. One gets off the train at the mill, goes up through it, and enters the Newhouse Tunnel and passes through this to its intersection with the Belden incline, and then goes up the Belden incline and comes out of it right in the town of Gilman on the top of Battle Mountain. You can, of course, get off the train at the town of Red Cliff and go up to Gilman by auto or wagon over the mountain road that runs from Red Cliff up over Battle Mountain through the town of Gilman and down into the valley beyond.

The Eagle Mill has Walker Roasters, Wetherill magnets and Wilfley tables. The ore is roasted. the magnets remove the roasted iron. The zinc and lead product as produced by the magnets goes to Palmerton through Tiltonville or is sometimes tabled, the table zinc going to our smelters and the table lead to the lead smelters.

The Eagle Mine office is in the town of Gilman, where we have an office building, staff houses, mechanics houses, boarding houses, bunk houses, a hospital, neighborhood house, recreation room, kindergarten school, library, and in general very excellent accommodations with good water and telephones. We are doing some sociological work and are greatly indebted to the New York office, to Palmerton, and to Franklin for very valuable assistance in this work, which is new to us.

We desire to develop and operate the Eagle Mines on a much larger scale and to furnish our plants with a considerable tonnage of desirable zinc concentrates. To do this we have under

Cleveland Mine

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consideration the driving of a long tunnel of at least 10,000 feet, the portal to be at the western end of Battle Mountain near the western end of Eagle canon, and to run right into the heart of the mountain connecting up with our present mine workings. In addition to this tunnel, a larger milling capacity will be needed. If a mill is built at the property it will probably be erected on the flat ground near the western entrance to Eagle canon and near the portal of the proposed new tunnel. It may be found possible to ship Eagle ores to Canon City mill for treatment, and if so, Canon City mill may have to be enlarged. This tunnel scheme and increased milling capacity is now receiving serious attention of the company.

As we desire this deposit to furnish our plants with large tonnages of desirable ore for years to come, the plants can materially assist by determining what is the best grade to smelt, as well as for what processes this ore is most needed and gives the best results. The Eagle mines are well worth seeing. If any of you get west do not overlook an opportunity to see them.

The Cleveland Mine owned by the company is located about 8 miles from Silver City, New Mexico. It is a low grade zinc sulphide proposition containing practically no lead. The ore is mined cheaply. We built a magnetic mill which treats the ore without any roasting. The concentrates from the mill are hauled by mule surface tram to the Santa Fe Railroad at Silver City. At present Palmerton uses these concentrates.

and Mill

The company owns the Hanover Mine at Hanover, New Mexico on the Santa Fe Railroad. At first this property was an important producer of high grade carbonate zinc ore. It still produces some ore of this character. Careful development by us opened up a large deposit of sulphide zinc ore. A magnetic mill was built which treats the ore without roasting. The con-

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centrates from this mill are being used at Palmerton. We believe the Hanover ore deposit to be a large one.

At Kelly, New Mexico, the company bought a few years ago the old Kelly mine. It was an old property containing oxidized and sulphide zinc ore. We have mined practically all of the oxidized ore. We built a small magnetic mill and have mined and milled practically all the sulphide ore. The mine is now being worked on a small scale by lessees who are gophering around in the old oxidized ore stopes and shipping a small production to the Iola plant.

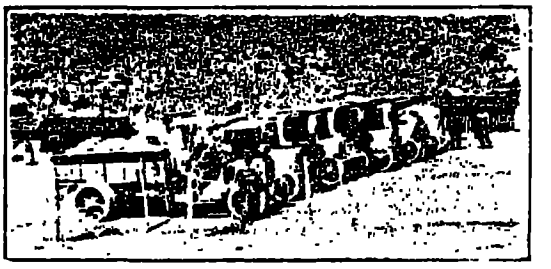
Kelly Mine

Some twenty miles from Tucson, Arizona, is the San Xavier Mine, purchased by the company a few years ago. It is a deposit of zinc sulphide ore containing some silver, copper and lead. We have developed the property to the point where we feel the deposit is of sufficient size to warrant a mill. It is our expectation that some day some kind of a mill will be erected. We have, also, mined and shipped some tonnages of oxidized copper and lead ores. At present the property is not operating but is being held in reserve.

In the State of Nevada, some twenty miles from the station of Arden on the Salt Lake road the company purchased a few years ago a small deposit of oxidized zinc ore known as the Potosi Mine. Due to its distance from the railroad and the long railroad haul to the smelters, a calciner was erected at the mine and the ore is calcined and then carried to the railroad by 6½-ton Sauer trucks. The coarse ore is calcined in the Stack furnace; the fines in a cylindrical dryer. Oil is used for fuel in the calciner operations. Potosi ore has been used at different times by practically all of our smelters. The mine has been successful financially, but the deposit is gradually being exhausted.

I have not attempted to give you any detailed technical information or any careful description of our mining and milling operations. Some day I hope you will hear all about these interesting matters from some one in the Mining department.

Our operations in the west are handled from the Denver office. We, also, maintain small offices at Salt Lake City, Utah, and Socorro, New Mexico. The Denver office is the clearing house between our Western properties and the other offices and smelting works of the company. In the early days Mr. Troutman had a one-room office in the Equitable Building with one assistant. Today we occupy all but two rooms on the seventh floor of the Symes Building and have a total office force of about 55. At Denver you will find Mining department, Ore department, Accounting department, Purchasing depart-



Potosi Trucks

ment, Traffic department. The secretary department, the Treasury department and Sales department are also represented at Denver. The Denver office supervises under the New York office the purchase of western ores, as well as the examination, purchase and operation of western mines. The prompt and accurate sampling at your plants of western ores, as well as the forwarding to Denver promptly accurate weight and assay reports covering these ores is of the same importance in the West as it is in Mexico, in order that the Ore department at Denver may continue to meet all competition and to secure for our plants the most desirable ores. We are now sending ores to Palmerton from the far western states, such as California, and the Palmerton plant is, therefore, coming into contact with not only the western branch of The New Jersey Zinc Company, but also with outside western mines.

The Empire Zinc Company desires to continue to examine, buy and operate mining properties, which by making regular shipments of desirable ores to our various plants will at least assist in preventing our plants from being at the mercy of outside ore producers. We must also buy in such quantity and quality and at the right prices outside ores that our plants require in addition to those produced by our own mines. We are, therefore, mining and buying ores for Palmerton and the other company plants to treat, but after all it is really one big complicated operation of the New Jersey Zinc Company, and being so, hearty and continuous co-operation from the acquirement of the crude ore by mining by purchase to the delivery to the consumer of the finished products made from the ore is, it strikes me, one of the biggest factors involved. To successfully co-operate across this great country of ours and through the various channels that the company organization provides, requires I believe that we should all become better acquainted and should reach a clearer understanding of our respective problems. This certainly includes the great Palmerton plant, as we are now mining and buying ores for you to turn into various finished products. We consider this plant at Palmerton as our plant and want you to feel that our mines are really your mines, and that East and West we are all workers in one big game, aiming by cooperation to win it for the New Jersey Zinc Company.

I am grateful to have had this opportunity to see this remarkable plant at Palmerton and to have been able to

Hanover Mine and Mill

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try to tell you something of the company operations in Mexico and Western U. S. A. We should like to have all of you see our western operations and to those of you who may on business or pleasure trips come to the western states, I extend to you on behalf of all of us in the West a hearty invitation to visit our offices and mines, and I can assure you all not only a hearty welcome, but some interesting things to see and some problems in which we want your interest and assistance.

Campaign of Palmerton Spelter Furnace No. 7

By Francis P. Sinn

Spelter Furnace No. 7, Convers & DeSaulles Recuperative Type, was closed down for repairs on December 4th, 1918, having completed a campaign of ten years and 136 days continuous operation. The shutting down of the furnace was necessary because of the failure of the front lining of the laboratory and of stoppage in certain of the gas and air ports. The back lining and top arch of the furnace were found to be in excellent condition, notwithstanding the remarkably long campaign of the furnace. The top arch was built in June, 1906, and the back wall in June, 1908. Both would have been good for a number of years more had not the shut down been necessary for other reasons.

The back wall installed on this furnace was the first of its kind used in this country, or anywhere as far as is known, for Belgian retorts. The first open back wall used by the company was installed in Furnace No. 19 at Bethlehem, Pa., a gas fired furnace of the Convers & DeSaulles type. The object of the open back wall was two-fold: first, to make possible the use of longer retorts, thus increasing the amount of ore charged per retort; and second, to give better support to the retorts, which were to carry the heavier load. It was found necessary after the furnace was put in operation to brick up the space between the shelves to prevent their sinking and the use of the long retorts was thus abandoned, but the furnace continued to operate successfully on the short retorts.

In the Fall and Winter of 1905, Furnaces No. 5 and No. 6 were started up in Palmerton with an open back wall. The long retorts were used but with little success, due to the failure of the back wall and the short life of both of these furnaces. The back lining of No. 6 furnace was rebuilt solid, but No. 5 furnace was rebuilt with the open back, but this time reinforced with solid blocks built up to support the arch for a distance of approximately six inches at the back of the shelving. The same coffin shaped brick and the three arch brick were used in the formation of each shelf, as were used in the original construction of furnaces No. 5 and No. 6 at Palmerton, This furnace so constructed, after a number of trials and tribulations, finally worked successfully with oval shaped retorts approximately five feet long. While this experiment was going on in furnace No. 5, furnaces No. 6 and Nos. 8 to 12 were completed and put into operation with the old style of solid back, using four foot retorts. A different type of open back was designed for the use of five foot retorts and installed in Furnace No. 7. In this design an open back was used with a separate flat plate to support each individual muffle. This doubled the number of pillars in the back wall and increased the length of the labora-

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A Monthly Magazine Printed for The New Jersey Zinc Company

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Year	Coker 1 Tons per Day	Coker 1 Tons per Man Shift	Kennedy Tons per Day	Kennedy Tons per Man Shift	Fox Tons per Day	Fox Tons per Man Shift	Black Jack Tons per Day	Black Jack Tons per Man Shift	Penna Tons per Day	Penna Tons per Man Shift	Coker 2 Tons per Day	Coker 2 Tons per Man Shift	Hoskins Tons per Day	Hoskins Tons per Man Shift	Total Tons per Day	Total Tons per Man Shift
1908	130	2 7	—	—	—	—	—	—	—	—	—	—	—	—	130	2.7
1909	143	2.9	—	—	—	—	—	—	—	—	—	—	—	—	143	2.9
1910	220	4 2	298	3.5	186	5.3	—	—	—	—	—	—	—	—	611	4.0
1911	284	3.2	540	5.1	205	5 0	—	—	—	—	—	—	—	—	1045	4.5
1912	439	5.0	417	5.0	183	6.2	—	—	—	—	—	—	—	—	1039	5.2
1913	540	5.3	506	5.3	196	6.1	—	—	—	—	—	—	—	—	1242	5.4
1914	581	5.6	593	6.7	345	5.9	355	4.6	—	—	—	—	—	—	1874	5.7
1915	680	7.1	612	7.4	496	7.2	504	6.8	371	5.9	428	6.9	—	—	3092	6.9
1916	778	7.3	537	6.7	553	7.9	612	7.5	783	8.5	656	8.1	—	—	3911	7.7
1917	798	7.4	462	7.0	489	7.4	640	7.1	496	7.4	748	8.6	—	—	3633	7.5
1918	504	6.0	331	6.7	—	—	563	8.1	—	—	612	8.3	793	10.6	2803	8.0

Coker No. 1 Mill Burned. Mine Idle 3 months.
No. 2 Mill at Kennedy burned in December.

Properties of the New Jersey Zinc Company

By F. P. NOLAN

The general scheme of operation of the New Jersey Zinc Company and its subsidiary companies is somewhat complex and to follow its products from the time they are taken out of the mine until manufactured into commercial products one ought to know in a general way the subsidiary companies and their respective places of operation. These subsidiary companies are:

The New Jersey Zinc Company (of Pa.)
Mineral Point Zinc Company.
The Empire Zinc Company.
Empire Zinc Company (of Mo.)
Prime Western Spelter Company.
The Tusla Fuel and Manufacturing Company.
The Bertha Mineral Company.
Hyatt Ore Corporation.

The companies conduct operations at the following places:

The New Jersey Zinc Company (which may properly be called the parent Company) at Franklin and Ogdensburg, New Jersey.

The New Jersey Zinc Company (of Pa.) at Palmerton, Freemansburg and Allentown, all in the State of Pennsylvania.

Mineral Point Zinc Company at Mineral Point, Wisconsin, Depue and Galena, Illinois and in the Illinois and Wisconsin mining fields.

Prime Western Spelter Company at Iola, Kansas and Tiltonville, Ohio.

The Empire Zinc Company at Belden, Canon City, Gilman and Leadville, Colorado; Hanover, Kingston, Silver City, New Mexico; Tuscon, Arizona; and Arden, Nevada.

Empire Zinc Company (of Mo.) at Joplin, Missouri.

Bertha Mineral Company at Kingsland and Cartersville, Georgia, and Austinville, Virginia.

The Tulsa Fuel and Manufacturing Company at Collinsville, Oklahoma.

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Hyatt Ore Corporation at Talcville, New York.

The New Jersey Zinc Company at its operations at Franklin and Ogdensburg, New Jersey, mines manganese bearing zinc ores of exceptional purity. The ores are concentrated at these mines and shipped to Palmerton where they are manufactured into Horse Head Spelter, oxide of zinc and spiegeleisen. Much of the mine timber used at the Franklin mine is gotten from its two timber tracts, one known as the Edison tract, on which is Camp Riker, a summer camp for girls and boys, and the Waywawanda tract, on which is a lake, seven miles long and about a mile wide, which would make, because of the natural beauty of the surroundings, an attractive place to spend a summer vacation.

The New Jersey Zinc Company (of Pa.) at Palmerton manufactures from the output of the mines of the parent Company and its subsidiaries spelter, oxide of zinc, zinc dust, lithopone, zinc plates and strips, zinc chloride, spiegeleisen, sulphuric acid, hydrochloric acid and salt cake.

At Freemansburg it manufactures French Process zinc oxide.

At Allentown it operates a limestone quarry, the entire product of which is shipped to Palmerton for use as a flux in blast furnaces in the manufacture of spiegeleisen.

The Mineral Point Zinc Company manufactures at Mineral Point, Wisconsin, sulphuric acid and zinc oxide, and at Depue, Illinois, spelter and sulphuric acid. It also operates mines in the Illinois and Wisconsin fields, with a mines office at Galena, Illinois. Except for a small amount of oxidized ores which is met with in the course of mining operations and some pyrite and galena, the entire product of these mines is sulphide zinc ore. This sulphide zinc ore is shipped to Mineral Point and Depue, there separated and roasted in the manufacture of sulphuric acid and then manufactured into spelter and zinc oxide, but principally spelter.

The general office of this Company at Chicago supervises the maintenance and coordination of the plants for adjustment of their output according to the ores available from the mines and according to the orders that must be filled. The mining of ore, however, is supervised by the Galena office.

The mines which this Company operates in the Illinois and Wisconsin mining field are located at the following points. Livingston, Wisconsin; Highland, Wisconsin; New Diggings, Wisconsin; Strawbridge, Wisconsin; Hazel Green, Wisconsin, and Galen Illinois.

The mines at Livingston, Wisconsin, are known as Coker No. 1 and No. 2; at Highland, Clark No. 2; at New Diggings, Penna and Hoskins; at Strawbridge, Fox; at Hazel Green, Kennedy; at Galena, Black Jack.

The Prime Western Spelter Company manufactures spelter at Iola, Kansas, and sulphuric at Tiltonville, Ohio.

The Empire Zinc Company operates a mine at Silver City, known as the Cleveland mine, where it produces sulphide zinc ores which are shipped to affiliated plants and roasted in the manufacture of sulphuric acid and later manufactured into zinc oxide.

It also operates the Hanover mine near Hanover, New Mexico, where there is produced a small amount of oxdized ores used for the manufacture of special grade spelter; its chief product is sulphide zinc ores which are shipped to Palmerton and manufactured into oxide.

At the Silver City or Cleveland mine, it also produces sulphide zinc ores which are disposed of in the same way as are the Hanover ores.

At Belden there are two mines known as Eagle No. 1 and Eagle No. 2, where principally sulphide ores are obtained which are shipped to plants of affiliated companies and roasted in the manufacture of sulphiric acid and later used in the manufacture of spelter and zinc oxide. It also produces a certain amount of silver and copper bearing iron ores incidentally encountered in the abstraction of the zinc ores which are shipped to copper smelters to be used as furnace flux.

At Canon City it maintains an ore

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concentrating plant where it concentrates the sulphide zinc ores received from its own and other mines and sends the concentrates to the manufacturing plants at Tiltonville, Depue and Palmerton, where they are manufactured into commercial products, principally spelter and zinc oxide and some sulphuric acid.

At Kingston, New Mexico, it has recently acquired a tract which has not yet been mined. This property will probably produce zinc bearing sulphide ores and considerable silver. It has also the San Xavier mine at Tuscon, Arizona, which has not been extensively operated. These last two properties may be regarded as future reserves.

The Bertha Mineral Company is engaged in mining and concentrating sulphide zinc ores and manufacturing zinc oxide at Austinville, Virginia.

It also operates an open cut Barytes mine at Cartersville, Georgia. The principal product, barytes, is shipped to Palmerton and used in the manufacture of lithopone. Some ochre is also found and is sold to manufacturers of linoleum and wall paper.

It also conducts a lumber operation at Kingsland, Georgia, the output of which is long leaf yellow pine, piling, ship stock, lumber and railroad ties, most of which is sold locally.

The Tulsa Fuel and Manufacturing Company operates a plant at Collinsville, Oklahoma, where spelter is manufactured.

Hyatt Ore Corporation has recently started an operation at Talcville, New York. It is still in the development stage.

The purpose of this article is to very generally outline the location and product of the various plants and mines of the New Jersey Zinc Company and its subsidiary companies and for use in connection with the map showing the various properties of the Company. To detail the various steps necessary to turn out a commercial product and to point out the complicated interrelation of the plants and mines would make a long story; suffice it to say that the operations of the parent Company and those of its subsidiaries are so interwoven that they are to a large extent inter-dependent.

The Road to France

By Daniel M. Henderson

Thank God our liberating lance
Goes flaming on the way to France!
To France—the trail the Gurkhas found!
To France—old England's rallying ground!
To France—the path the Russians strode
To France—the Anzacs' glory road!
To France —where our lost Legion ran
To fight and die for God and man!
To France—with every race and breed
That hates Oppression's brutal creed!
Ah—France how could our hearts forget
The path by which came Lafayette?
How could the haze of doubt hang low
Upon the road of Rochambeau?
How was it that we missed the way
Brave Joffre leads us on today?
At last, thank God! At last we see
There is no tribal Liberty!
No beacon lighting just our shores!
No Freedom guarding but our doors!
The flame she kindled for our sires
Burns now in Europe's battle fires!
The soul that led our fathers west
Turns back to free the world's oppressed!

Allies, you have not called in vain!
We share your conflict and your pain!
"Old Glory", through new strains and rents,
Partakes of Freedom's sacraments
Into that hell His will creates
We drive the foe; his lusts, his hates!
Last come we will be last to stay—
Till Right has had her crowning day!
Replenish, comrades, from our veins,
The blood the sword of despot drains,
And make our eager sacrifice
Part of the freely rendered price
You pay to lift humanity—
You pay to make our brothers free!
See, with what proud hearts we advance
To France!

(This poem won the prize of $250 offered by the National Arts' Club of New York for the best patriotic poem.)

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ceived from sale of land thereby reducing sinking fund to 70% of land sales, and provision permitting the trustee to reject offers of bonds for sinking fund purchase, on the ground that the price is in excess of the market value. Authorized, $16,500,000, of which $10,044,800 outstanding as of Dec. 31, 1924; $4,500,000 held by Trustee; $129,500 in treasury; $1,118,800 cancelled and $706,900 unissued. Secured by deed of trust covering all property. Listed on San Francisco Stock & Bond Exchange and Los Angeles Stock Exchange. Company pays normal income tax of 2%.

Capital Stock: 1. Natomas Co. of Cal. 6% non-cum. preferred: Authorized, $7,250,000; outstanding, $6,823,200; par $100. Has preference as to assets and dividends. No dividends paid to April, 1925. Rating, *Ca*

2. Natomas Co. of Cal. common: Authorized, $9,250,000; outstanding, $9,249,500; par $100. No dividends paid to April, 1925. Rating, *Da*

Preferred listed on San Francisco Stock & Bond Exchange.

THE NEW JERSEY ZINC COMPANY

History: Incorporated Oct. 30, 1880, in New Jersey, as The New Jersey Zinc & Iron Co. Name changed to present title and capital increased from $3,000,000 to $10,000,000 in 1897, to $35,000,000 in 1915 and to $50,000,000 in 1920. Mines located at Franklin and Ogdensburg, N. J. Manufactures zinc oxide, slab zinc, spiegeleisen, lithopone, sulphuric acid, rolled zinc strips and plates, zinc dust, zinc chloride, salt cake, barium carbonate, sodium sulphide, black ash, metallic cadmium and zinc sulphide, with a smelting capacity of about 100,000 net tons of slab zinc per annum. The company acquired the Durex Chemical Co. in 1923.

Subsidiaries: Company owns the stock of the Empire Zinc Co., New Jersey Zinc Co. (of Pa.) operating plants at Palmerton, Pa., and Freemansburg, Pa.; Chestnut Ridge Ry. Co.; The Mineral Point Zinc Co., The Tulsa Fuel & Manufacturing Co., and The Bertha Mineral Co.

Management: OFFICERS: Edgar Palmer, Pres.; A. P. Cobb, Vice-Pres.; J. E. Hayes, Vice-Pres.; A. B. Schultz, Sec.; H. S. Wardner, Treas.; G. F. Wolff, Comp.; E. V. Peters, Gen. Sales Mgr.; W. J. Lee, Gen'l Pur. Agt., New York. DIRECTORS: W. P. Hardenbergh, J. E. Hayes, T. D. Jones, Edgar Palmer, Edwin M. Squier, John J. Riker, C. W. Cox, Walter Douglas, Wm. Woodward. ANNUAL MEETING: Last Wednesday in February, at Newark, N. J. MAIN OFFICE: Newark, N. J. NEW YORK OFFICE: 160 Front St.

Comparative Income Account, Years Ended Dec. 31

	1924	1923	1922	1921	1920	1919
Net earn. (after dep. & taxes)	$6,565,643	$6,524,404	$6,180,263	$2,339,838	$7,968,863	$9,408,095
Fixed charges	160,000	160,000	160,000	160,000	160,000	160,000
Reserve to retire bonds	.....	.....	.....	.....	225,000	300,000
Balance	$6,405,643	$6,364,404	$6,020,263	$2,179,838	$7,583,863	$8,948,095
Dividends	4,906,160	4,883,234	4,768,152	3,567,984	5,600,000	7,000,000
Bonus to employees	340,000	360,000	360,000	.....	.....	368,000
Surplus	$1,159,483	$1,121,170	$892,111	(d) $1,388,146	$1,983,863	$1,580,095
Earned on stock	13.05%	12.99%	12.48%	4.79%	18.06%	25.57%

Table A.—Bond Records and Ratings (Based on Five Year Income Results, Etc.)

NAME OF ISSUE	Interest Payable	Maturity	Authorized	Outstanding	Average Income Available	Interest Required Per Annum	Factor of Safety	Security	Salability	Rating
1. New Jersey Zinc Co. 1st 4s...	A&O	O. 1926	See text	$4,000,000	$5,915,802	$160,000	97%	High	High	Note

NOTE: Bonds not rated as no balance sheet is furnished.

1. The New Jersey Zinc Co. first gold 4s: Dated Oct. 1, 1901, due Oct. 1, 1926. Interest paid A. & O. 1 at company's office, 160 Front St., New York. Coupon, $1,000; registerable as to principal. Farmers Loan & Trust Co., New York, Trustee. Secured upon all the real estate of the company, and all of its mines, minerals, mining rights, buildings, machinery, fixtures, franchises, good will now owned or hereafter acquired, and all of the capital stock now owned in the New Jersey Zinc Co. (of Pa.), the Mineral Point Zinc Co., and the Empire Zinc Co., and all the capital stock of any other corporation or corporations which may hereafter be purchased by the company. Original authorized, $10,000,000, of which $4,000,000 were issued, the balance to be issued only for the purchase of new property, including the capital stock of new corporations, or for the construction of new plants to be erected upon property owned by the company, or upon property owned by corporations the capital stock of which is owned by the New Jersey Zinc Co. and pledged under its mortgage. Originally authorized, $10,000,000; outstanding, $4,000,000; of the $6,000,000 of unissued bonds, $4,600,000 had been cancelled to Jan. 1, 1925, making the present authorized amount $5,400,000. The mortgage provides for the cancellation of $200,000 of unissued bonds yearly on Oct. 1, beginning 1902, the authorized amount of bonds to be reduced accordingly, and after all of such unissued bonds have been cancelled the company is required to pay to the trustee annually on Oct. 1, $200,000 as a sinking fund for the purchase or redemption of outstanding bonds at not exceeding par and interest. Bonds are subject to redemption for the sinking fund at par and interest on any interest date on four weeks' notice. So long as the company shall make no default in the payment of interest or principal of the bonds, it may sell and convey free, and discharge from the lien, any of the mortgaged property, rights, etc., and any and all of the capital stock of other corporations owned by it and pledged under the mortgage, the moneys received by the company in this way to be applied to the payment of the actual cost of new construction or for the acquisition of new property. All moneys not so applied, and which shall have remained in the trustee's hands for one year, shall be transferred to the sinking fund and applied to the purchase of outstanding bonds at not exceeding par and interest. Company pays normal income tax of 2%.

Table B.—Stock Records and Ratings (Based on Five Year Income Results, Etc.)

NAME OF ISSUE	Rate of Dividend	Amount Outstanding	Average Income	Dividend Requirement	Factor of Safety	Equity in Surplus	Salability	Rating
1. New Jersey Zinc Co. stock	8% Qu F.	$49,081,600	$5,710,802	$3,926,528		Note	Good	Note

NOTE: Equity cannot be shown nor stock rated as no balance sheet is furnished. For stock description see next page.

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Filename: 1898 USGS Annual_Report.pdf

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TWENTIETH ANNUAL REPORT

OF THE

UNITED STATES GEOLOGICAL SURVEY

TO THE

SECRETARY OF THE INTERIOR

1898–99

CHARLES D. WALCOTT
DIRECTOR

IN SEVEN PARTS

PART VI—MINERAL RESOURCES OF THE UNITED STATES, 1898
METALLIC PRODUCTS, COAL AND COKE

DAVID T. DAY, CHIEF OF DIVISION

WASHINGTON
GOVERNMENT PRINTING OFFICE
1899

EPA7-001995

ZINC.

By CHARLES KIRCHHOFF.

PRODUCTION.

The zinc industry has, generally speaking, had a good year in 1898. The consumption has been large, and prices have been above the average of recent years. To a considerable extent this has been counterbalanced, from the smelter's point of view, by the rapid rise in prices of ore, which has brought unusual activity and great prosperity to the miners of southwest Missouri and southeast Kansas. The year has witnessed an interesting struggle, becoming more and more acute between the older smelting plants in Illinois, Missouri, and Kansas, using coal as a fuel, and the new works in the Kansas natural-gas belt, of which Iola is the productive center. The advantage of free gas in the direct lessening of cost and in the indirect economies in the metallurgical operations is causing a transfer of the industry to the favored locality.

For a series of years the production of spelter has been as follows:

Production of spelter in the United States.

Year	Short tons.	Year.	Short tons.
1873	7,343	1889	58,860
1875	15,833	1890	63,683
1880	23,239	1891	80,873
1882	33,765	1892	87,260
1883	36,872	1893	78,832
1884	38,544	1894	75,328
1885	40,688	1895	89,686
1886	42,641	1896	81,499
1887	50,340	1897	99,980
1888	55,903	1898	115,399

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In the different States the production has been as follows:

Production of spelter in the United States, by States.

Year.	Eastern and Southern States.	Illinois.	Kansas.	Missouri.	Total.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1882	5,698	18,201	7,366	2,500	33,765
1883	5,340	16,792	9,010	5,730	36,872
1884	7,861	17,594	7,859	5,230	38,544
1885	8,082	19,427	8,502	4,677	40,688
1886	6,762	21,077	8,932	5,870	42,641
1887	7,446	22,279	11,955	8,660	50,340
1888	9,561	22,445	10,432	13,465	55,903
1889	10,265	23,860	13,656	11,077	58,860
1890	9,114	26,243	15,199	13,127	63,683
1891	*a* 8,945 *b* 4,217	28,711	22,747	16,253	80,873
1892	*a* 9,582 *b* 4,913	*c*31,383	24,715	16,667	87,260
1893	*a* 8,802 *b* 3,882	*c*29,596	22,815	13,737	78,832
1894	*a* 7,400 *b* 1,376	*c*28,972	25,588	11,992	75,328
1895	*a* 9,484 *b* 3,697	*c*35,732	25,775	14,998	89,686
1896	*a* 8,139 *b* 2,427	*c*36,173	20,759	14,001	81,499
1897	*a* 7,218 *b* 3,365	*c*37,876	33,396	18,125	99,980
1898	8,631	*c*47,103	40,132	19,533	115,399

a Eastern. *b* Southern. *c* Including Indiana.

For semiannual periods the production of spelter has been as follows:

Production of spelter, by semiannual periods.

States.	First half 1892.	Second half 1892.	First half 1893.	Second half 1893.	First half 1894.	Second half 1894.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Eastern Southern	6,901	7,594	7,380	5,304	5,064	3,712
Illinois and Indiana	15,483	15,900	16,427	16,169	13,392	15,580
Kansas	14,161	10,554	13,269	9,546	11,250	14,338
Missouri	8,954	7,713	8,718	5,019	6,458	5,534
Total	45,499	41,761	45,794	36,038	36,164	39,164

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Production of spelter, by semiannual periods—Continued.

States.	First half 1896.	Second half 1896.	First half 1897.	Second half 1897.	First half 1898.	Second half 1898.
	Short tons.	*Short tons.*	*Short tons*	*Short tons.*	*Short tons.*	*Short tons.*
Eastern	4,517	3,622	3,866	3,352	2,955	3,981
Southern	1,200	1,227	1,305	2,060	1,695	
Illinois and Indiana	16,305	19,868	18,054	19,822	22,129	24,974
Kansas	11,361	9,408	15,722	17,674	21,464	18,668
Missouri	5,548	8,453	7,956	10,169	10,371	9,162
Total	38,921	42,578	46,903	53,077	58,614	56,785

During the first half of 1898 the production of the Illinois plants was 20,475 tons, rising to 21,808 tons during the second half, while the Indiana plants increased from 1,654 tons during the first six months to 3,166 tons during the last six months.

Figures bearing on the transfer of the production to the works in the gas belt are of special interest. During the first half of 1898 the total output of the works near the ore districts was 27,838 tons, of which 7,738 tons were produced by new works in the gas belt. During the second half the total output in the ore district was 23,827 tons, of which 11,533 tons are credited to the plants using gas. Thus the coal plants declined from 20,100 tons to 12,294 tons. It must be noted that the Iola plant of the Robert Lanyon's Sons Spelter Company was inactive a part of the second half of the year because injured by a fire, and that the four works building in the gas belt had not yet entered the ranks of producers. The works now running and those in course of erection possess an aggregate capacity of 40,000 short tons per annum, a capacity which will not be reached, however, until the second half of 1899.

In detail the movement in the transfer of old works to the gas belt and the establishment of new plants has been as follows:

The Robert Lanyon's Sons Spelter Company first erected in 1897 a large smelter at Iola, Kansas, and followed it with new works at La Harpe, which went into operation during the second half of that year. Messrs. W. & J. Lanyon, at Iola, added to the 600 retorts at work in January a like number in February, and increased the plant to 1,800 retorts in November. The works No. 6, at Scammon, of the Cherokee-Lanyon Spelter Company have been dismantled and have been removed to Iola. They are not yet in operation. The Prime Western Spelter Company has new works at Iola which have begun to make spelter with 600 retorts, having a capacity of from 450,000 to 500,000 pounds monthly. This capacity is to be doubled in a short time. Another new plant, just started, is that of Mr. George E. Nicholson at Iola. They have fired up 600 retorts, and 600 additional are to start about the middle of March, 1899. The Edgar Zinc Company is now building a

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1,200-retort plant at Cherryvale, Kansas, which it is expected will be in operation in June, 1899. In March the Edgar Zinc Company acquired the Glendale plant of Mr. S. C. Edgar, near St. Louis, Missouri.

In Indiana the Fairmount Zinc Company began operations with 300 retorts, having a capacity of 300,000 to 400,000 pounds per month. It is the intention to double the plant in the spring of 1899.

Among the older works the following changes may be noted: The Collinsville Zinc Company, at Collinsville, Illinois, has increased its capacity 50 per cent; the North Chicago plant of the Empire Zinc Company started another furnace in October, increasing the capacity 50 per cent; the Humphrey Spelter Company has made additions which carry the monthly capacity up to 500,000 pounds; the Girard Smelting Company, at Girard, Kansas, has leased from the Cherokee-Lanyon Spelter Company the two plants of the Girard Zinc Company and the Kansas Zinc Mining and Smelting Company; the Cherokee Smelting Company has leased the No. 12 plant of the Cherokee-Lanyon Spelter Company at Cherokee, Kansas; the Columbia Zinc Company is now operating the Marion, Indiana, plants.

In February, 1899, a consolidation was effected under the name of the Lanyon Zinc Company between the Robert Lanyon's Sons Zinc Company and Messrs. W. & J. Lanyon, each owning two plants. Of these three are in the gas belt. The company also controls a large tract of natural gas and oil lands. The capital stock consists of $1,000,000 common and $2,000,000 8-per cent preferred stock.

ZINC MINING IN GALENA-JOPLIN DISTRICT.

PRODUCTION.

The zinc mining industry enjoyed an unusually prosperous year in 1898. The principal source of supply of zinc ore is the Galena-Joplin district of southeast Kansas and southwest Missouri. Local statistics of sales show that the quantity of zinc ore marketed was 89,300 tons in 1888, which rose to 98,440 tons in 1889, and 114,900 tons in 1890. In 1892 sales of 148,150 tons were reached. The general business depression affected the industry during the succeeding year, and it was not until 1896 that an output of 147,588 tons was attained. Then came a jump to 181,535 tons in 1897, followed by sales attaining 235,123 short tons in 1898. The figures are those compiled by the Joplin Herald, the totals of the different districts being as follows, in the order of their magnitude:

Product of lead and zinc ore in the Galena-Joplin district in 1898.

Camp.	Zinc ore.	Lead ore.	Total value.
	Short tons.	*Short tons.*	
Galena	73,848	7,878	$2,247,004
Joplin	37,168	8,329	1,400,307
Carterville	23,303	4,246	790,676
Oronogo	16,730	429	483,113

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Filename: 1898-08-25 PWSC Articles of Inc.pdf

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STATE OF MISSOURI

DEPARTMENT OF STATE

MDCCCXX

To all to Whom these Presents shall Come:

I, Samuel B. Cook, Secretary of State of the State of Missouri, and Keeper of the Great Seal thereof, hereby certify that the annexed pages contain a full, true and complete copy of Articles of Association of the Prime Western Spelter Company filed August 25, 1898 and of Certificate of Incorporation issued to said company on the date aforesaid, of statement increasing capital stock from $50,000.00 to $100,000 filed April 25th 1901, and of affidavit changing number of directors from 5 to [illegible] filed May 29th 1902 as the same appears on file and of reco[illegible] in this office.

In Testimony Whereof, I hereunto set my hand and affixed the Great Seal of the State of Missouri. Done at the City of Jefferson, this 14th day of October A.D. 1904

Sam B. Cook

SECRETARY OF STATE.

By J. H. Edwards
Chief Cl[illegible]

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