

The Engineering and Mining Journal

VOL. LXXXVII.

NEW YORK, JUNE 19, 1909.

NO. 25.

The Lorraine Deposits of Oolitic Iron Ore

A District with Extensive Reserves of Nearly Self-fluxing Ores, Admirably Adapted to the Basic Steel Processes by their Phosphorus Content

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The iron mines of Lorraine are of great interest to the miner, the metallurgist and the economist. The miner will consider the importance of the deposits, the various methods of working the seams and the special difficulties that were encountered in shaft sinking. The metallurgist will recognize the importance of finding an ore directly suitable to the Thomas basic converter process, and the economist will appreciate the many problems that may arise from an iron field spreading over four different European countries and constituting the largest iron deposit in the world. The reserve is estimated at 4,000,000,000 metric tons.

their enormous tonnage are situated close to existing railway systems, not far from the German collieries and in a rich and well developed part of the world. In addition coal seams have been discovered recently at deep levels under the iron seams, and although they present great difficulties in working they may be considered of importance for the future.

As will be seen on the accompanying map, which shows only the more important portion of the iron field, the mines extend over territory mainly in French and German Lorraine, and over a limited portion of Luxemburg and Belgium. These deposits have been known for more than

output which in 1906 was about 27,000,000 tons. The relative importance of this deposit in the three leading countries is shown by the following statement of their reserves: Luxemburg, 300,000,000 tons from an area of 3600 hectares; Germany, 1,100,000,000 tons from an area of 43,000 hectares; France, 2,500,000,000 tons from an area of 43,186 hectares; giving a grand total of about 4,000,000,000 tons and an area of 89,786 hectares. Mr. Bailly, engineer of the French government, has estimated the probable development of the mines in these three countries and has graphically represented these reserves in an accompanying diagram.



GENERAL VIEW OF SURFACE EQUIPMENT AT THE MOUTIERS IRON MINE—BRIEY DISTRICT

To realize the importance of this iron field the reserves of the most important fields of the world must be quoted; they are as follows, according to various authors: Great Lakes (U. S. A.), 1,000,000,000 metric tons; Bilbao (Spain), 25,000,000; Sweden, 800,000,000; Ural (Russia), 800,000,000.

The well known Bilbao district never contained more than 100,000,000 tons. The new Ouenza mines (Algeria) that are to be worked soon are situated in a wild country; they will not yield more than 60,000,000 tons and will necessitate the construction of a special railway 140 km. long, while the mines of Lorraine with

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a century and until the war of 1870-71 belonged almost entirely to France. When the new boundary between France and Germany was marked on the ground, the German representatives were accompanied by the chief engineer of mines of their Government with a view of getting most of the mines known at that time.

INFLUENCE OF BASIC STEEL PROCESSES

Since 1871 the development of the iron mines has been considerable, particularly since the invention of the Thomas basic converter process in 1880 which made possible the treatment of the phosphoric ores known in Lorraine as *minettes*. The discovery of the deep levels of the Briey district has given a new impulse to the

The output is increasing every year in Germany and France and remains stationary in Luxemburg. The official statistics give Luxemburg an annual production of 6,000,000 tons; Germany's production in 1906 was 14,000,000 tons as against 7,500,000 in 1900. In 1900, France mined in this field only 4,500,000 tons, 7,800,000 in 1906 and 8,738,000 tons in 1907. Belgium produces only 70,000 tons yearly. Though the French output is the lowest, its ore reserves are probably the largest. This is due to the fact that the ferruginous deposit outcrops mainly in Luxemburg and Germany. In France the principal mines are "deep levels" which were only opened after carefully prospecting the Briey district during the years 1894 to 1899. How-

ever, from a French point of view it is notable that these mines take every year a larger place in the general output of iron ores. The Lorraine production now constitutes over 85 per cent. of the French iron-ore output and about 70 per cent. of the total production of pig iron.

DESCRIPTION OF THE DEPOSITS

As will be seen from the accompanying map, these deposits are located in the eastern part of France and western part of Germany. The country is hilly and consists of uplands divided by the valleys of several tributaries of the Meuse and Moselle rivers. They are in the "Basin of Paris," a large basin where the ancient seas have deposited sediments from the lowest Jurassic up to the upper Tertiary, all the ore seams being inclined toward the center of the basin.

The iron seams of Lorraine are at the upper level of the Toarcian and rest upon green pyritic marls and sandstone. Just above them are micaceous marls belonging to the Bajocian. The ferruginous deposits comprise a number of seams separated by more or less sterile marls or limestones. A drilling made at Villeroy (France) encountered these various seams and their analysis and thickness are given in the accompanying table.

DRILL-CORE OF LORRAINE IRON DEPOSIT.

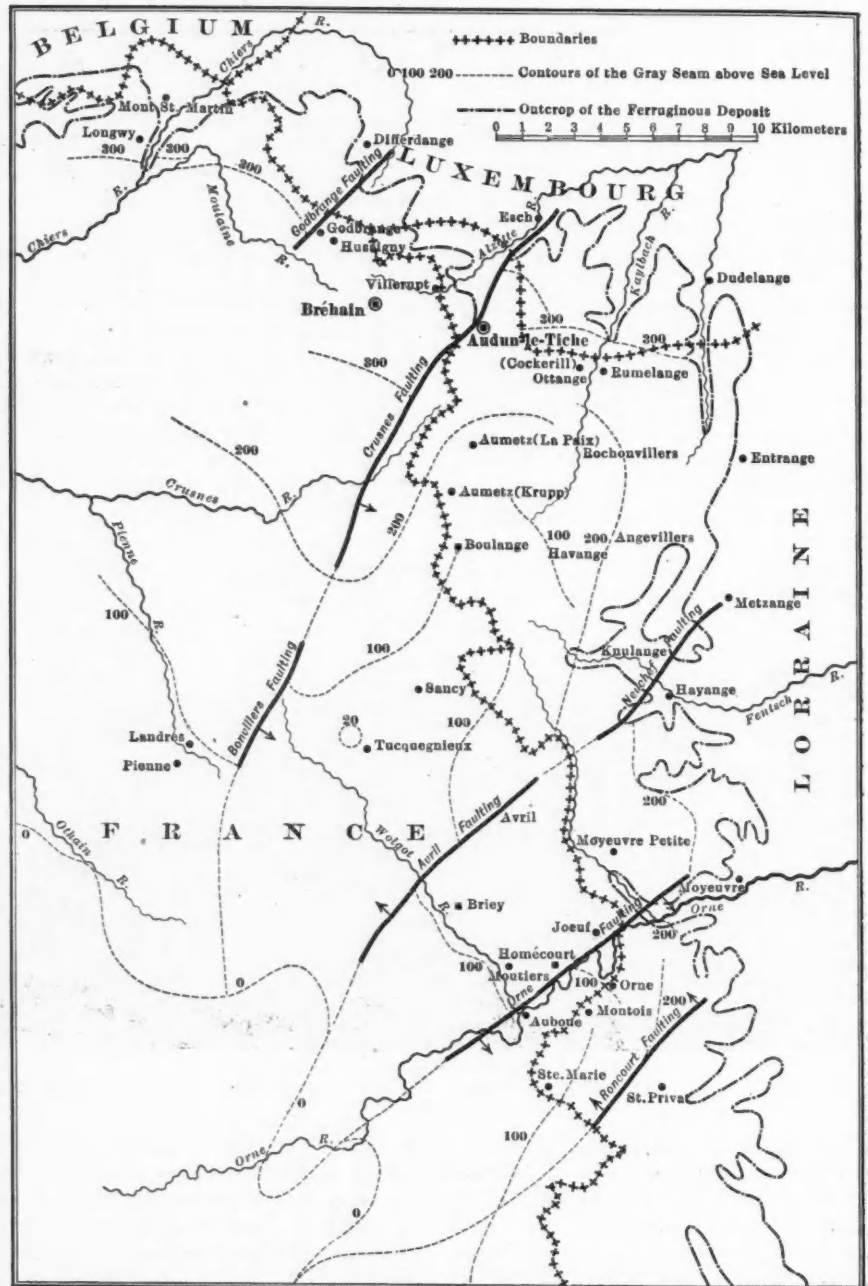
Description of the Seam.	Thickness in Meters.	Fe Per Cent.	CaO Per Cent.	SiO ₂ Per Cent.
Micaceous marls.....	18.80	5.72	3.65	58.8
Poor limestone.....	2.10	13.78	33.39	11.02
Ferruginous limestone (I)	2.00	24.24	16.84	14.21
Poor limestone.....	4.00	10.60	34.35	11.97
Poor red seam..... (II)	2.75	18.70	23.73	15.50
Ferruginous gray and blue marl.....	4.60	19.28	18.01	26.18
Yellow seam..... (III)	1.20	33.69	14.31	7.29
Gray seam..... (IV)	4.20	39.10	6.95	6.97
Brown silicious seam (V)	1.95	30.86	8.78	20.27
Ferruginous marl.....	8.25	21.10	12.75	27.58
Black vein..... (VI)	1.15	32.58	12.47	4.95
Gray vein.....	3.62	23.54	5.64	29.34
Upper Lias sandstone (wall of the deposit).	0.40	11.84	9.37	48.92

The percentages and thicknesses of the seams vary greatly with the locality where the sample is taken and the line of separation of the seams is not always precise. In the Briey district, the miners call the veins I and II the upper level, veins III and IV the middle level, and the veins V, VI and VII the lower level. It is difficult to say *a priori* which seam will be payable as this depends chiefly on the local conditions and management. Usually not more than three veins are worked at the same time in the deep mines. For example, at Micheville the output is about 1000 tons per day, divided as follows: Ferruginous limestone (I), 650; red seam (II), 250; gray seam (IV), 100 tons. The ore from vein I averages 29 per cent. iron; from vein II, 38 per cent., and 40 per cent. in the gray seam.

In general the total thickness of the whole of the ferruginous deposit varies from 25 to 50 m., being smaller near the ends of the formation. For example, the thickness never exceeds 10 m. at the south, near Nancy, while the exploitable portion is about 50 per cent. in quarries, and decreases to 15 and even 10 per cent. in the deep mines. The average inclina-

THE BASIN OF BRIEY

The basin of Briey in France is of much importance to the iron works of the region and is the continuation of all the above basins under 100 to 200 m. of barren limestone. The researches in this basin were the result of the absence of lime in the silicious and poor iron ores of Longwy. The numerous companies which



SKETCH MAP OF THE LORRAINE IRON FIELD

tion of the seams is 1 to 2 per cent. toward the west. They outcrop all along the Jurassic hills of Lorraine, and are divided by the geologists into several basins, as follows: In France, in the basins of Nancy and Longwy; in Luxemburg, in the basins of Differdange and Esch-Rumlange; in Germany, in the basin of Moyeuve-Hayange.

own iron and steel works in French Lorraine close to the German boundary, knew there were many calcareous iron ores mined in Germany, and started drilling in the early '80s. They found the seams at varying depths and requested concessions, the first of which was granted in August, 1884.

The difficulties of sinking the shafts

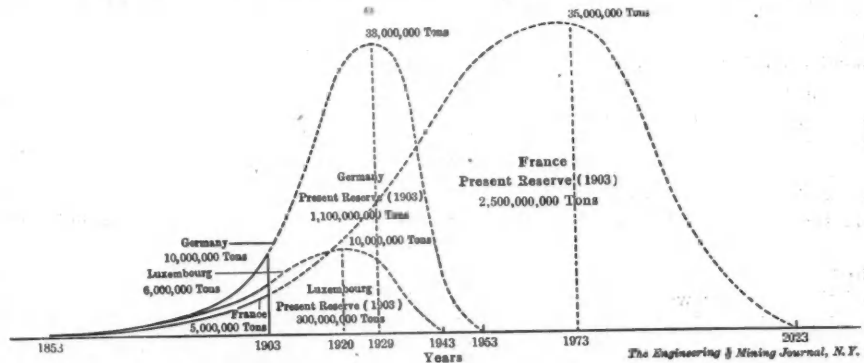
were great as large quantities of water were encountered, as much as 3 cu.m. per min. having to be pumped out. These difficulties joined with an industrial crisis after 1888 caused the abandoning of all the attempts to sink shafts. Three years later de Wendel & Co. resumed their work at Joeuf, and after a second unsuccessful attempt, succeeded in 1896 in sinking the first shaft of the region to a depth of 70 m. The first ore was hoisted in 1898. The other companies profited by this first success and the Société des Hauts Fourneaux, Forges et Aciéries de Pont à Mousson in 1897 started a shaft by freezing the ground and completed it with success in 1900. This was the only shaft sunk by the Poetsch freezing process in this region. The other companies were able to sink their shafts by pumping out about 3 cu.m. per min. Some companies met with still larger quantities of water. For example, at Moyeuve (German Lorraine) they pumped out an average of 12 cu.m of water per min., the maximum being 30 cu.m. per min. in the wet season. All these shafts range between 100 and 250 m. deep.

The basin of Briey has been divided by geologists into four subsidiary basins, this separation being based on the numerous faultings which are encountered and which are of considerable importance from two points of view: that of geology, and of

posing into a pulverulent oxide of iron. Thus the iron oxide would be situated along these faults and close to them. The accompanying section through Luxemburg will show the importance of these faultings and explain why the ferruginous seams are in the same locality sometimes worked by quarries, by galleries on hill-sides, and by shafts.

is a hydrated oxide of iron, Fe_2O_3 , with a clayey, calcareous, or silicious gangue. It is an oolitic ore, varying in color from yellow brown to red brown. Under the microscope the concentric seams of hydrated oxide are seen surrounding a small earthy grain. An average complete analysis of the Lorraine ore would show: Loss by ignition, 18.37 per cent.; SiO_2 , 5.60; Al_2O_3 , 4.61; Fe_2O_3 , 39.77; FeO , 10 to 16 (Fe = 31 to 40); P_2O_5 , 1.85 (P = 0.8); MnO , 0.42 (Mn = 0.32); CaO , 12

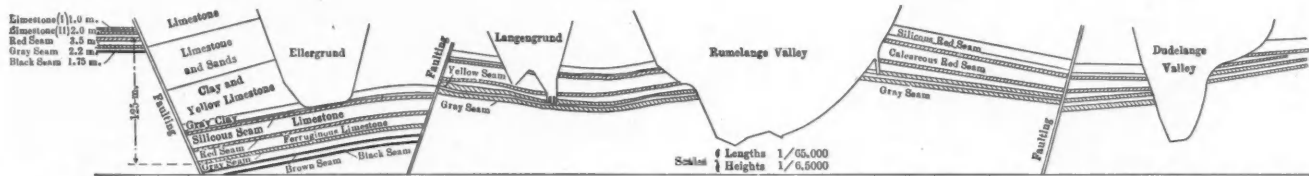
HYDROLOGY OF LORRAINE
The hydrology of Lorraine is of im-



GRAPHICAL REPRESENTATION OF THE ORE RESERVES IN THE LORRAINE FIELD

importance to the mineowners by reason of the quantities of water that are met with both in sinking shafts and in developing the mines. The presence of water is due to three causes: (1) The rivers, mainly

to 18; MgO , 1.22; H_2SO_4 , 0.22 (S = 0.08). Phosphorus is present as phosphate of lime and phosphate of iron. It is in close relation with the iron and its percentage varies with that of iron in the oolitic ore.



CROSS SECTION THROUGH LUXEMBURG—NORTHEASTERN SECTION OF THE LORRAINE IRON FIELD

hydrology. The main faults are shown on the accompanying map, as well as the outcrop of the ferruginous deposits, and in dotted lines the contours of the gray seam. These faults are the boundaries of the basins, which are named Bassin de l'Orne, de Moutiers-Avril, d'Aumetz-Tucquegnieux and de Landres.

The geologists who have studied the basin of Briey attach much importance to these faults in explaining some of the peculiarities of the deposits, and especially the fact that the veins are richer along the valleys than under the uplands. It should be noticed that the main faults are almost parallel to the valleys of the region. There are, however, two systems of faults at right angles, the main one being southwest-northeast and the others southeast-northwest. As the zones of richness of the ore have the same setting, Mr. Villain, mining engineer of the French government, presented in 1902 a theory in which he considers these faults as feeders through which the thermal waters, saturated with carbonate of iron, welled up under the Toarcian, the carbonate decom-

the Orne and its tributary, the Woigt; (2) an underground sheet in the Jurassic limestone; (3) a deeper sheet in the ferruginous formation. The latter two are insulated, one from the other, by the micaceous marls of lower Bajocian, but are put into communication by means of the faults.

The varying conditions throughout the Basin of Briey, due to the various inclinations of the faults and positions of the rivers, cause great differences in the quantities of water that are to be pumped out in the four secondary basins. The average quantities of water in cubic meters per minute that are encountered in sinking shafts in the various basins are: Orne, 2.75; Aumetz-Tucquegnieux, 6.66; Landres, 1.75; Moutiers-Avril, 1.33. In development work less water is encountered; the Orne basin is an exception, however, the average flow there being about 4.75 cu.m. per minute.

THE PHOSPHORUS CONTENT

The main feature of this ore is the constant presence of phosphorus. The ore

However, in the poor ores its proportion increases, owing to a larger quantity of phosphate of lime. In the gray seam, which is the favored one in Lorraine, the proportion of phosphorus to iron is practically constant, the average analysis being: Fe, 33.62 per cent.; P, 0.73; or a phosphorus content of about 2.15 per cent. per unit of iron.

This proportion is so constant that the blast-furnace men rarely determine phosphorus in the smelting charges. They know that in a charge containing 30 per cent. iron there is approximately 2 per cent. of phosphorus per unit of iron, and that the pig iron will run about 1.8 per cent. phosphorus. Notwithstanding this constancy in the ore, the presence of silicon in the pig, varying from 0.3 to 0.8 per cent., causes variation in the percentage of phosphorus in the basic bessemer slags. These slags will usually average as follows: P_2O_5 , 16.19; CaO , 47.05; MgO , 3.75; FeO , 11.35; MnO , 6.46; Al_2O_3 , 7.60; SiO_2 , 7. These slags are sold to manufacturers of fertilizers at a profit of about \$5 per metric ton, corresponding to

about 33c. per ton of ore smelted. As the cost of a ton of ore is in some cases in the neighborhood of this amount, it will be seen that the sale of the slags nearly pays for the mining of the ore in the most favorable instances.

OPEN-CUT AND HILLSIDE EXPLOITATION

The ferruginous veins are worked either by open cut, by galleries in the hillside, or by shafts. According to the French mining law of 1810, all the metallic mines, including coal, belong to the State, and concessions are granted by the government after the demandor has proved the existence of the mine, his financial capabilities, and also when the government engineers are satisfied the enterprise can be profitable. The owner of the ground above the mine has no right of preference on the mine except that where the iron ore can be worked by open cut it belongs to the owner of the ground down to the depth where the work is no longer on a paying basis. Below this point the mine is the property of the State and can be granted to another man than the owner

nel is to be extended to a total length of 10 km. It has advanced at the rate of 1 km. per year and at a cost of 350 fr. per m. The cost of haulage is 2 centimes per ton per kilometer.

Secondary galleries, shown as *R* in the accompanying sketch, are driven from the main haulage gallery. These secondary galleries are from 2 to 3 m. wide. At intervals of from 8 to 15 m., large galleries *V* are mined with a width of 3 to 7 m. The angle between galleries *V* and *R* is determined by the inclination of the seam and the direction of the cleavage. The pillars thus formed are 5 to 8 m. wide and from 50 to 100 m. long, according to the conditions obtaining at the particular mine. They are mined in coming back toward the gallery *R*, the farthest pillars being cut down first. The rooms *C*, which are formed, are soon filled up by the caving of the roof, the rule being that every room is protected on two sides by ore *in situ*. As long as the gallery *R* is used for haulage, protective pillars *P* are maintained and are broken down later.

The size of the face of the pillars is

MINES IN THE BRIEY DISTRICT.

Names of the Mines.	Area of Property, Hectare. ^a	Tons Hoisted at the End of 1908, Metric Tons.	DEPTH		Water Pumped per Minute, Liters. ^b
			Of Shafts at Work, Meters.	Attained at the End of 1908, Meters.	
Homécourt..	894	5,854,315	122	193	2,100
Auboué-Moineville..	1,437	4,313,838	128	.....	5,700
Moutiers....	696	2,603,482	100	.....	910
Joëuf.....	1,744	2,745,740	69	.....	300
Tucquegnieux-Bettainvillers..	1,659	913,480	240	.....	4,850
Landres....	553	833,485	214	.....	4,718
Pienne....	862	480,851	220	.....	1,300
Stacy....	735	217,930	240	.....	1,200
Ammermont-Dommary..	1,021	3,600	245	.....	1,333
Jondreville..	501	.....	234	.....	140
Jarry....	812	.....	.....	174	900
La Mourrière..	474	.....	.....	133	50
Murville....	496	.....	.....	111	500
St. Pierre-mont-Valleroy....	917	.....	.....	114	84
Drostaumont	886	.....	.....	.....	.....
Anderny-Chevillon..	1,170	.....	.....	.....	.....
	916	.....	.....	40	.....

^aOne hectare = 2.47 acres.

^bOne liter = 0.264 gal.



HAND DRILLING IN THE MOUTIERS MINE, BRIEY DISTRICT



ELECTRIC DRILLING AT THE MOUTIERS MINE

of the ground. Similar arrangements exist in the laws of Germany and Luxemburg, so that, in practice, the quarries of Lorraine iron ore are not deeper than 10 to 17 m. Quarry properties are extensively worked in Luxemburg, and in France, near Longwy.

The hillside mines are numerous in Luxemburg, also in France, in the valleys of Alzette, Orne, and Moselle, and in the Orne valley in Germany. Some of the mines are worked from very long main galleries, such as that of the mine d'Hayange at Knutange, which is 2 km. long and has a cross-section 3 m. high by 2.5 m. wide; that of the Société Stumm Frères from Entrange to Rochonvillers is 5.5 km. long, and that of the Société Roehling & Cie., from Beuvrange to Angevillers is 5.5 km. long with a section 2.5 m. high by 3.20 m. wide. In the latter electrically driven rope haulage is used. The Roehling tun-

determined by the solidity of the roof, and also by the greater efficiency of the workmen on large faces. It was found that the greatest efficiency was obtained with a width of 8 to 10 m., but the character of the roof does not always allow even a width of 6 m. In some mines, such as that of Val-de-Fer, in the Bassin de Nancy, and that of Mont St. Martin, in the Bassin de Longwy, where regular and almost horizontal seams are met with, electric ore cutters and electric drills are used. The cutters are of the Morgan-Gardner type fitted with chains. The power required is from 20 to 40 h.p., according to the hardness of the ore and the speed. In a 2-m. seam they gave a monthly output of 6000 tons per machine at a lower cost than by hand. Several seams in a mine are worked at the same time and in some cases hand-picking of the ore is necessary. Electric locomotives

and electric pumps are used in many mines and the galleries are usually lighted by electricity. The miners, however, have individual acetylene lamps. Ventilation is effected without fans by shafts connecting the different levels.

SHAFT MINES

The deep mines are located in the Bassin de Briey and furnish the excellent iron ore of that district. The advantages of this ore may be summarized as follows: (1) The ore is hard and compact and may be delivered to the blast furnace in lumps. (2) The percentage in phosphorus is always the same and is the very proportion convenient for producing basic bessemer pig iron, allowing the production of that quality without any analysis or mixture with other ores. (3) It gives valuable phosphorus slags as a by-product of the basic bessemer process. (4) Its richness

permits a smelting charge carrying 33 to 35 per cent. iron, instead of 28 to 30 per cent., as with other Lorraine ores, and a coke consumption 12 per cent. lower than the usual quantity. The corresponding economy is about 5.50 fr. per ton of ore, or 15 fr. per ton of pig iron for works situated close to the ore and buying its coke at 27 fr. per ton.

For a plant situated near the coal deposits in the North and buying the ore, the economy is 6.5 fr. per ton of ore. The ore of Briey is sold at a premium of 3 fr. over the other iron ores of the region. Its qualities, increased by its calcareous character, give it a wide market not only in France, but also in Belgium, Luxemburg and in Germany as far north as Westphalia. Some of the German steel producers are interested in these mines and special railway tariffs were introduced in Germany for the importation of the Briey ores.

The output in 1906 was over 3,000,000

pit dry while sinking a "deep-well pump" is installed. It consists of a number of pumps placed at different levels, the power being applied by a vertical rod as in Cornish pumps. Each pump feeds the pump placed above it. The first one is fed by a centrifugal sinking pump suspended in the pit and driven by a 3-phase motor. As the work advances the shaft is lined either with bricks or often with cast-iron panels, behind which a layer of cement is deposited to fill the space between it and the ground.

As soon as the ferruginous seams are reached the permanent pumps are installed. As the life of the mine depends upon the reliability of these pumps, only first-class machinery is installed. They are steam-driven and usually have a capacity of about 10 cu.m. per min. However, a plant of 28-cu.m. capacity per minute has been installed in one mine at a cost of \$200,000. The working cost is low, being 3 to 4 centimes (0.6 to 0.8c.) per cu.m.

ore cars having a capacity of about 2 metric tons of ore; the daily output is usually about 2000 tons in 20 hours. The method of working the seams is the same as in the case of hillside mines.

The sinking of the two shafts to 200 m. and their complete equipment with the necessary machines, buildings, workmen's houses, general expenses, etc., cost as a rule about \$1,000,000. To prevent damage to the buildings on the surface, large pillars are left in the mine to avoid as far as possible the effects of the caving of the roof. The installation of hydraulic filling plants has been carefully considered by the mine owners and the problem has been solved at the Auboué mine by using granulated slags and a marl- ish limestone which can be got cheaply in the country. The cost amounts to 10c. per ton of ore.

At some of the mines large electric power plants have been installed for supplying power to the various parts of the



UNDERGROUND ELECTRIC HAULAGE IN THE BRIEY DISTRICT



UNDERGROUND LAVATORY AT THE MOUTIERS IRON MINE

metric tons with only four mines (Joeuf, Homécourt, Auboué, Moutiers) in operation. At present 10 mines are at work and others are preparing for production. There will soon be 19 mines at work in this district which will make a large increase in the output. All these mines belong to iron and steel producers and, up to 1909, 43 mines have been granted to 32 companies. Through the courtesy of Georges Rolland, president of the Acéries de Longwy, the accompanying table is given, presenting some particulars about these deep mines at the end of 1908. The concessions granted by the government have an average area of 900 hectares (about 2223 acres). They are usually worked by means of one shaft for hoisting and one for the proper ventilation of the mine. As usual in France these shafts are circular with a diameter of 5m. generally.

HANDLING THE WATER

As explained above, the main difficulty that was met with in sinking the shafts was the presence of water. To keep the

when pumping against a head of 100 meters.

As the quantity of water to be pumped out may double in the wet season, a second pump of same capacity but of cheaper type is always installed. It is usually a multi-stage centrifugal pump, electrically driven. In addition the set of sinking pumps is kept for use in case of breakage of one of the other pumps.

The shaft used for ventilation is not sunk until the first one is completely fitted up with all the pumping machinery. A drill hole is then made in the center of the proposed shaft and a gallery is driven to connect the main shaft with the bottom of the bore hole. Thus all the water that is met with in sinking the second shaft goes down through the bore hole and gallery to the bottom of the main shaft whence it is pumped out by the existing machinery.

MINE EQUIPMENT AND COSTS

The main shaft is equipped with the usual machinery; the cages contain two

MINING COSTS UNDER VARIOUS CONDITIONS.

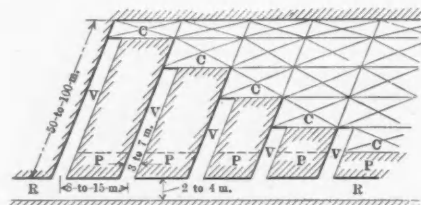
	cents.	cents.	cents.	cents.	cents.
Mining and underground transport	24	34	30	43	53
Various upkeeps..	5	8	4	12	10
Hoisting and pumping.	2	8	.....	.....	.....
Outside transport	2	2	2	1	.....
General expense....	4	4	4	4	10
Total....	37	56	40	60	73

Shaft mine, 100-m. deep, no pumping, 4-m. seam, excellent roof; annual output, 300,000 tons.
 Shaft mine, 100-m.; pumping 3 cu.m.; 3.5-m. seam; 65 per cent. left in pillars; annual output, 40,000 tons.
 Hillside mine, 3-m. seam, excellent roof; annual output, 300,000 tons.
 Hillside mine, 1.8-m. seam, bad roof; annual output, 800,000 tons.
 Hillside mine, 1.2-m. seam, bad roof; annual output, 80,000 tons.

property. As all the mine owners are iron smelters most of the power plants are driven from power obtained by gas engines utilizing the gas from the blast furnaces, with an economy of 50 per cent. over steam power. There were in 1906, 5500 workmen employed in the mines. The laborers are paid 3 fr. and the best miners 10 to 12 fr. The average is 5 fr. The efficiency of a miner is calculated to be about 1000 tons of ore per year. All the mines are connected with the lines of the Eastern Railway Company by private tracks, the longest of which does not exceed 3 kilometers.

In the accompanying table are some details of the cost of one metric ton of iron ore delivered on car on the nearest lines of the Eastern Railway Company under various conditions in France, according to Mr. Bailly.

Other mines 180 m. deep with an annual output of 550,000 tons from a 3-m. calcareous seam, and pumping 12 cm. m. per min., get a cost of 60c. per ton, of which 15c. is due to pumping by steam. It is estimated that at 200 m. with an annual output of 600,000 tons and pumping of 10 cm. m. per min., the cost will be as follows: Mining, transport and mainte-



PLAN OF THE GALLERIES

nance, 35c.; general expenses, 3; pumping (steam), 14; depreciation on plant in 20 years, 13; total, 65 cents.

In France the iron and steel works, treating the ore of this district in 1907, embraced 21 reduction plants belonging to 19 companies. Ten of these companies produce only pig iron. The number of blast furnaces was 76, of which 68 were running, producing 2,500,000 metric tons of pig iron. The steel works comprised 30 Thomas converters, 8 open-hearth furnaces, 31 steam hammers and 43 rolling mills, giving an output of 1,212,500 tons of steel, or 51 per cent. of the French steel production.

Figures collected for THE MINERAL INDUSTRY show that the output of carborundum in the United States in 1908 was 4,907,170 lb., valued at \$294,430. In 1907 the production was 7,532,670 lb., valued at \$451,960.

The Chinese government proposes to develop the oilfields of Shensi. Foreign capital is not wanted. If Chinese capital is not to be had, the government will undertake the work.

The Broken Hill Proprietary Company

The report of this New South Wales company for the half-year ended Nov. 30 1908, and the chairman's address to the shareholders discuss the labor troubles that occurred at the commencement of the year and which led to a stoppage of operations. At the close of 1906, owing to the high price then ruling for lead, the directors granted a general advance of wages, averaging about 12½ per cent. The agreement made with the men was for two years and was to expire Dec. 31, 1908. During 1908 prices fell, and the directors decided that a return to the old scale of wages paid in 1906 was necessary, in order to make the company's business remunerative.

The Mineowner's Union was not unanimous about reducing the scale of wages and the other Broken Hill companies, with the exception of Block 10 Company, agreed to continue the advance given under the previous two years' agreement. The Proprietary Company and the Block 10 Company made, however, an offer to the men to pay on the previous basis with a sliding scale based on the price of lead, which offer was declined by the miners. The dispute was then taken to the Arbitration Court, after an offer had been made by the directors to abide by the award of that Court and had been refused by the miners' union. The Arbitration Court decided in favor of the higher wages as paid by the other mining companies. Against this decision the directors have appealed to the High Court, being advised by their counsel that the judge had gone beyond his jurisdiction in his award. The decision of the High Court is being awaited. The scale of wages acceptable to the union depends on an assumed "living wage." On this point the chairman makes the following remarks. "The term 'living wage,' as referred to by Mr. Justice Higgins, is no doubt a most pleasant sounding term in theory, but in practice it is quite impracticable. The factor that guides in this matter must be what can the worker give in labor for the value he receives, and if the industry cannot pay the rate fixed by the worker, then the industry must be discontinued and the worker be without employment. No legislation or arbitration court can artificially set aside for any length of time the natural law governing such matters, and all attempts in this direction must ultimately end in failure and disaster; as what is the value of an award on paper with no employment?"

Before the Arbitration Court sat, an undertaking was given by the miners' union to accept the award of the court, but the company merely undertook to resume operations, in accordance with the courts' award, as far as regards the pro-

duction of zinc concentrates and so far as regards the smelting and treatment of lead concentrates purchased from other companies. These latter contracts will expire with the present year, except one which expires in March next year. The company would not assure the court that it would resume full operations as before. The life of the mine as an ore-producing concern is estimated at five years, and only 2½ years at the present rate of extraction. A continuation of operations on a reduced scale appears, however, to have been promised, and on this understanding the court considered the case; and its main object being to decide what was a proper wage for human labor under the conditions prevailing and not to dictate to the company what work should be carried on. The award of the court, as stated above, was not accepted by the company, on the plea that the judge had exceeded his powers and an appeal to the High Court was lodged.

With regard to the operations of the company the first unit of the spelter plant at Port Pirie was completed during the half-year and an addition of nine furnaces decided on. The smelters put through an increased quantity of material, treating 132,979 tons as against 115,266 tons for the preceding half-year. The refinery turned out from the bullion treated 47,833 tons of soft lead, 2,589,416 oz. fine silver and 1054 oz. gold. The disposal of the lead for the six months ending Nov. 30, 1908, has been as follows: To Europe, 38,852 tons; to India China and Japan, 7508; to Australia and New Zealand, 3750; total, 50,110 tons. Trade with the Far East has been well maintained.

In the mine development work in the lower levels has not proved as satisfactory as was anticipated, but at the 900-ft. level good ore, though of no great extent, is being found.

The average prices received during the six months were for lead £13 4s. 7d. per ton; for silver (standard) 23.93d. The gross profit amounted to £34,430, and the net profit to £25,791. The fire in Block 11 is not giving any anxiety and is not likely to do so in the future. The ore reserves, which on May 31, 1908, were shown as 3,000,000 tons have been reduced to 2,735,153 tons by the mining during the six months of 264,847 tons. During the half year no considerable new ore-bodies have been found. The average cost of mining, inclusive of development work, etc., has been 15s. per ton or about 1s. 8d. per ton less than in the preceding half-year.

According to *The Iron Age*, May 6, 1909, the largest ore freighter, the "Shenango," was launched at Detroit, Mich., May 1. The boat is 607 ft. long, 58-ft. beam and 32 ft. deep. Capacity, 13,000 tons of ore or coal, or 488,000 bushels of wheat.

The Zacatecas District and Its Relation to Guanajuato and Other Camps

By C. W. BOTSFORD*

This is not an article on the Zacatecas district in its entirety, but merely some notes on the geology near the city of Zacatecas, and its relation to that of Guanajuato and other parts of Mexico. The similarity between many of these districts in Central Mexico is very pronounced especially in the succession of the formations and the faulting and vein-systems.

Topographically, the Zacatecas area is situated in a rather low range of mountains that rise about 1000 ft. above the central plateau of Mexico. These are well rounded and smoothed by the action of the elements and fade gradually away into the smooth low foothills, and these gradually into the surrounding plains. Extensive faulting has occurred here, but it is not perceptible in the present topography.

SUCCESSION OF FORMATIONS

Cretaceous shales have been exposed by erosion both to the east and west of the city. This is the oldest formation exposed in the district. They are the same black, calcareous, thinly-bedded shales that are found to such extent at Guanajuato. They have been much folded and bent, and sericitization and silicification has been extensive in some parts of the district. These shales underlie the whole country but have only been exposed near the borders of the mineralized area. They were followed by much erosion before the volcanic activity began.

The first volcanic activity produced great quantities of andesitic breccias. These consolidated breccias are precisely similar in appearance and composition to the rock at Guanajuato, called the Guanajuato conglomerate. At Zacatecas, these breccias are on the average a little finer and contain greater percentages of ash and tuff than the average agglomerate at Guanajuato. There is also, I think, more perfect evidence of water action.

At Zacatecas, the series of rhyolitic and andesitic breccias present at Guanajuato do not occur. These formations, I think, are always local and are the indications of an intermediate and comparatively quiescent stage when only a few local volcanic districts were in eruption.

The diorite intrusion followed the andesitic breccias probably at a lapse of considerable time. Near the city, this intrusion seems to have forced its way in between the shales and the conglomerate and to have penetrated irregularly upward. There has been much contact

metamorphism, producing many varieties of changes from the red agglomerates into greenish, indurated rocks similar to the La Luz schists of Guanajuato. This change is well exposed in the streets at the eastern end of the city and along the road to Guadalupe.

Following the diorite intrusion came the folding, followed by extensive erosion. At this time Zacatecas probably assumed approximately its present topography.

The later rhyolites mark the resumption of volcanic activity. They are a very extensive series of rhyolitic breccias and tuffs, the latter called *cantera* in many parts of Mexico. This formation from Zacatecas to the north has only been left by the erosion on the top of the Bufo. South of the town the whole country is still capped by this material. This formation was also present at Guanajuato but has been largely removed by erosion except in a few areas on the tops of the mountains.

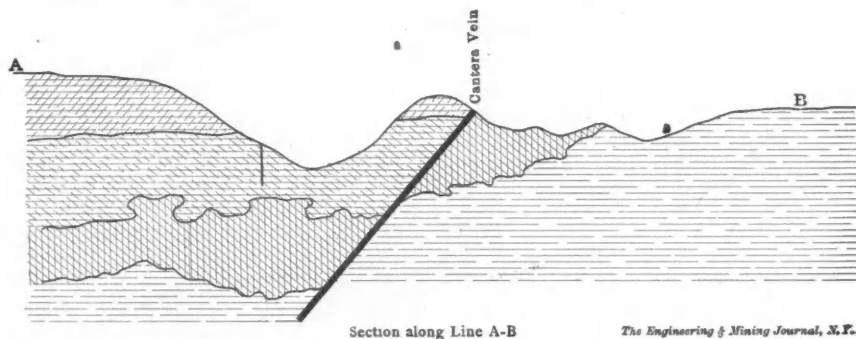
In tabular form the succession of for-

of Central Mexico from the State of Jalisco northward to Durango.

Following these came a comparatively quiet period when the volcanic activity only occurred in local districts. This was the time of the series of eruptions at Guanajuato, the Pinguico rhyolites and andesites, which are missing at Zacatecas. The last effort of this first stage of vulcanism was, I think, the intrusion of the granites and diorites. These have evidently been the cause of many of the ore deposits.

After this final effort of the intrusions, the country seems to have had a long rest from volcanic disturbances. Then came the principal faulting caused by the settlement and adjustment of the strains resulting from the long period of vulcanism. During this long rest extensive erosion took place.

The second period of vulcanism gave the later rhyolites. Their extent was enormous, nearly the whole of the western part of Mexico having been covered by these eruptives. From Guerrero on the



CANTERA VEIN AND SURROUNDING FORMATIONS

mations at both Zacatecas and Guanajuato, from the youngest down, are as shown in the accompanying table.

SUCCESSION OF FORMATIONS AT ZACATECAS AND GUANAJUATO.

ZACATECAS.	GUANAJUATO.	
Later rhyolites	Later rhyolites	Miocene (?)
Unconformity.		
Diorite intrus'n	Granite intrusion Diorite intrusion Andesite breccias Pinguico rhyolites Bufo sandstone	Eocene
Missing formations		
Guanajuato conglomerate		
Unconformity.		
Cretaceous shales	Cretaceous shales	Cretaceous

TWO STAGES OF VULCANISM

There seems to have been two well defined stages of volcanic activity in Central Mexico, each of which is traceable over extensive areas. The older was the long series of andesitic eruptions which have resulted in the Guanajuato agglomerate and similar formations in various parts of Mexico. These rocks are widespread and persistent in large areas

south, far into Chihuahua on the north, and from the eastern parts of the States of San Luis Potosi and Guanajuato to the Pacific Slope on the west, the whole country has been generally covered.

The principal development of these rhyolites was along the western axis of the Sierra Madre. Known thicknesses of 5000 ft. are common for this formation. Very recent basaltic flows have followed these rhyolites but are of only local interest.

FAULTING AND VEIN-FORMATION

The principal faults of both Zacatecas and Guanajuato are those striking northwest-southeast, and dipping westwardly. These are always normal faults. This system of faults is persistent and extensive through all the central portion of Mexico. At Zacatecas this system is illustrated by the Cantera and Veta Grande veins. The Mala Noche vein dips in the opposite direction, and is more in the nature of a cross-vein and was probably caused by relieving a twisted strain. As at Guanajuato, the ore deposits are replacements along these fault planes. At Zacatecas, unlike Guanajuato, the ores

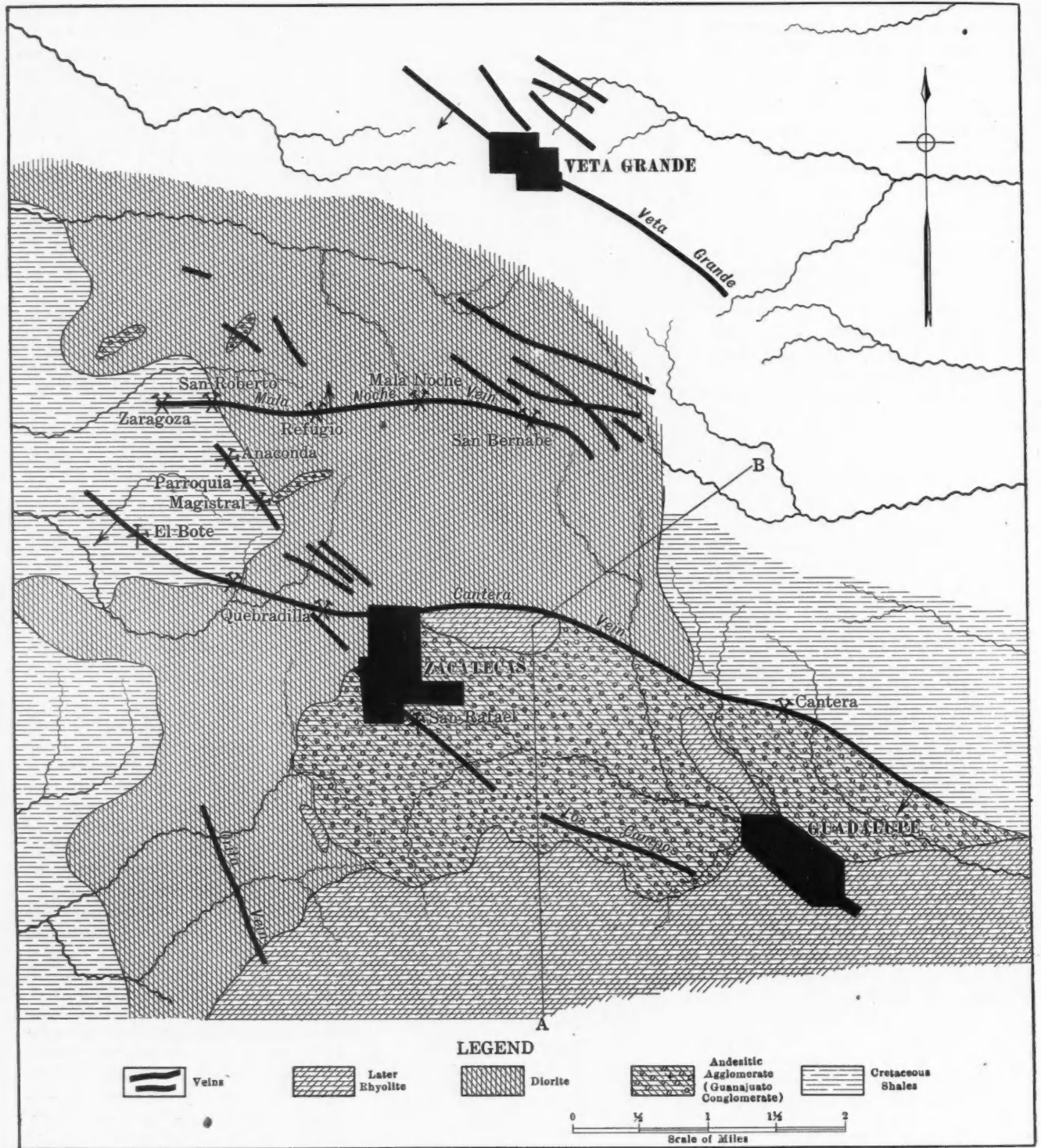
*Mining engineer, Springville, N. Y.

tend to run into base-metals. The Veta Grande and the west end of the Cantera vein carry only silver and a small content of gold. The Magistral and Mala Noche veins run into copper and iron bases; at

partly from a map published in the JOURNAL of Aug. 29, 1908, and partly from my own notes.

Statistics collected for THE MINERAL

1908 production 80,329,578 short tons were anthracite, with an average value of \$1.98 per ton at the pit mouth, and 334,124,486 short tons bituminous coal, worth \$1.14 at the mines. The price of the anthracite



GEOLOGICAL SKETCH MAP OF THE ZACATECAS DISTRICT

the eastern end of the Cantera vein the ore runs base with lead and zinc.

The accompanying sketch map and cross-section gives a general idea of the geology of the district. This is taken

INDUSTRY show that the production of coal in the United States during 1908 amounted to 414,454,064 short tons (\$541,692,127), as compared with 480,033,945 short tons (\$640,803,723) in 1907. Of the

in 1907 was \$1.99, and of the bituminous coal \$1.19 per short ton, the production being 86,341,832 short tons of the former variety and 393,692,113 short tons of the latter.

Goldfield and the Goldfield District of Nevada

Since Discovery of Goldfield Approximately 50 Per Cent. of the State's Output of Gold Has Come from This Camp; Dividends Paid, \$12,000,000

BY JOHN TYSSOWSKI

During recent years mining developments in Nevada have attracted widespread attention. The State has once more been through a boom and this time has weathered the storm. In the late spring of 1903 Goldfield was discovered, and by the end of that year had already begun to produce precious metals. Since 1904 this one camp has far outdistanced all the remainder of the State as a producer of gold.

The accompanying tables show, for the years 1902-1908, inclusive, the commercial value of the gold, silver, and total gold-silver production of Nevada, and of Goldfield alone; also the percentage that Goldfield has contributed to the total output of the State. It may be noted that Goldfield has produced \$27,000,000 in the last five years (1904-1908), or 48 per cent. of Nevada's total gold yield for that period. As

tain order. The dispute was at last satisfactorily arranged for both sides.

Visitors to southern Nevada formerly came away with the impression that Goldfield was merely a temporary camp. Comparison was often made with Tonopah, bringing out the permanent and solid appearance of the older camps as compared with the makeshift conditions found in Goldfield. This was true at first, when most of the properties were being worked on leases, but it does not apply at present.

The present population of Goldfield is estimated at 6000 and is of a much more permanent character than it was during the rush days when it was supposed to amount to about 10,000. The completion of the proposed railroad to connect Goldfield with Ely, will, no doubt, add materially to Goldfield's prosperity.

the only satisfactory one, of a mining camp's permanency, is its record as a dividend payer. Already this year one company, the Goldfield Consolidated, has paid a dividend of \$1,063,803.90, and has declared another of equal amount (3 per cent.), payable July 31. The dividends paid by Goldfield companies in 1908, a year in which many companies all over the world discontinued dividends, totaled \$1,578,500, made up as follows: Florence Goldfield, \$420,000; Engineer's Lease, \$570,000; Rogers' Syndicate, \$300,000; Mohawk Jumbo, \$78,000; Frances Mohawk, \$45,500; Florence Annex, \$50,000; Red Top Consolidated, \$20,000; Little Florence, \$30,000; Mohawk Combination, \$65,000. Other dividends, of which I have no record, may have been paid. This is a splendid record when it is considered that the two largest properties in the

GOLD AND SILVER PRODUCTION OF NEVADA AND GOLDFIELD COMPARED.

Year.	GOLD.		Percentage from Goldfield.	SILVER.		Percentage from Goldfield.	TOTAL VALUE.		Percentage from Goldfield.
	Nevada. (a)	Goldfield.		Nevada. (a)	Goldfield.		Nevada.	Goldfield.	
1902.....	\$2,895,300	.....	..	\$1,985,486	.....	0.007	\$4,880,786	.....	..
1903.....	3,070,350	\$70,670	2	2,098,912	\$155	0.007	5,169,262	.....	..
1904.....	5,060,494	2,341,979	46	2,432,830	11,374	0.47	7,493,324	2,353,353	40
1905.....	5,269,819	1,882,951	36	3,915,177	5,188	0.13	9,184,996	1,888,139	21
1906.....	10,470,704	7,026,154	62	4,536,310	10,484	0.23	15,007,014	7,036,638	55
1907.....	15,411,000	8,408,396	54	5,465,100	47,329	0.86	20,876,100	8,455,725	40
1908(e).....	15,500,000	7,458,000	48	4,500,000	42,000	0.93	20,000,000	7,500,000	40
Totals(c)...	\$51,712,017	\$27,117,480	(b)48	\$20,849,417	\$116,375	(b)0.52	\$72,561,434	\$27,233,855	(b)39

(a) Figures used represent mine reports as agreed upon by Director of the Mint and the U. S. Geological Survey. (b) Average percentage for last five years. (c) Only years 1904-1908 inclusive are included in totals.

a producer of silver, it is seen that Goldfield is inconsequential, contributing only 0.52 per cent. of the total output of the State.

The growth of the mines of Goldfield has been vigorous and constant. Only in 1905 and again in 1908 did the production fail to increase over that of former years. However, the cause for this is plainly apparent. In 1905, the year after the first wild rush into the district, people began to put in permanent equipment and to develop their properties; leasing was also less active, and companies began to store low-grade ore to await completion of reduction works on the ground. In 1908 the setback was due to the financial depression. At the same time when we consider that the year's production from Goldfield represented only nine months' work, it is evident that even in hard times the camp continued to grow. During the first three months of 1908, Goldfield suffered from a bitter labor controversy, and it was at this time that General Funston took the regulars into Goldfield in order to main-

The Goldfield mills, when those under construction are completed, will be capable of treating 1000 tons of ore per day. The Nevada Reduction has a capacity of 100 tons; the Combination, 80 tons; the new Goldfield Consolidated, 500 tons; and the Florence, 200 tons. The new Goldfield Consolidated and Florence mills are of the latest type; they have been described in the JOURNAL.¹ The accompanying map and index sheet show the location of the greater part of the mining claims in the Goldfield district. The area included in the map is about $10\frac{1}{2} \times 7\frac{3}{4}$ miles, and 437 claims are shown. On the index sheet several of the companies have no number in the column designating the claims on the map. This is accounted for by the fact that the claims are not located within the area shown by the map, or else the company has been merged into some other one, under the name of which it is to be found.

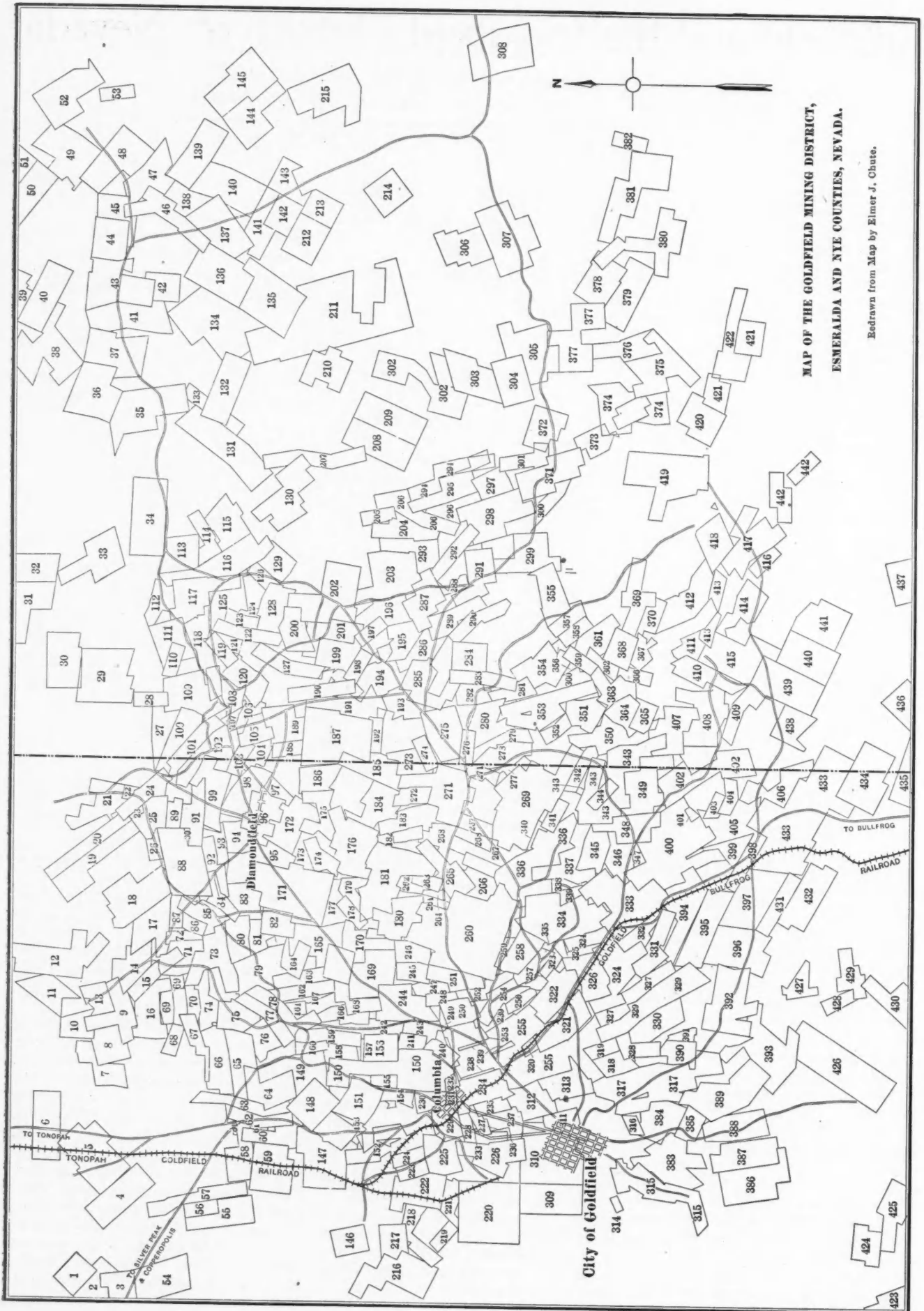
The best indication, and to the public

¹Sept. 5, 1908.

camp, the Goldfield Consolidated and the Florence companies, were building new mills and did not pay dividends.

The dividends declared in 1907 amounted to nearly \$1,500,000. Previous to 1908 almost \$8,000,000 had been paid to the investing public by Goldfield companies. Thus, to date the mines have paid dividends amounting to approximately \$12,000,000.

It is early to form an idea of what the 1909 production of Goldfield will be; judging from the returns to date, however, this year will be a record breaker. The output for four weeks selected at random is as follows: Week ending March 13, \$220,000; March 20, \$332,000; April 13, \$507,850; April 27, \$609,650. These figures, which are possibly a little high, show a steadily increasing output; even taking \$300,000 as an average week's production, the year's total will amount to \$15,600,000, or over 200 per cent. of the total for 1908. At present the Goldfield Consolidated and Florence are the largest producers in the camp.



MAP OF THE GOLDFIELD MINING DISTRICT, ESMERALDA AND NYE COUNTIES, NEVADA.

Redrawn from Map by Elmer J. Chute.

Index to Map of Goldfield

A multi-column index listing mining companies and their page numbers. Columns include 'Goldfield', 'Big. Bonanza M. & Co.', 'Goldfield Santa Anna M. & M. Co.', and 'McMahon Gold M. Co.'. Companies listed include Acord M. Co., Adams Goldfield M. Co., Ajax Group, Albemarle M. & M. Co., Alcalde G. M. Co., Alexandre M. Co., Alpine Group, Andesite Group, Apache Diamondfield M. Co., Associated M. & Del. Co., Atlanta Mines Co., Band Gold M. Co., Banner M. Co., Barsing Bon. M. & Expl. Co., Baltimore Goldfield M. Co., Big Jim Group, Big Ledge Group, Black Anta M. Co., Black Bird M. Co., Black Butte Annex M. Co., Black Butte Bonanza M. Co., Black Butte Ext. M. Co., Black Eagle Group, Black Rock Golf'd M. & M. Co., Blizzard M. Co., Blue Bull M. Co., Blue Quartz G. M. Co., Booth Gold M. Co., Buena Vista Gold M. Co., Butte Goldfield M. Co., Butterfly Group, Cache Gold M. Co., Camp Bird M. Co., Cascade Group, Chawalle Gold M. Co., Chicago Goldfields M. Co., City of Goldfield M. Co., Clara M. Mining Co., Clear Luna M. & M. Co., Colorado & Cape Nome M. Co., Columbus Lee Jackson M. Co., Columbia Mtn. M. Co., Columbia M. Co., Columbia Mtn. Ext. M. Co., Combination Annex M. Co., Combination Ext. Mines Co., Combination Frac. L. & M. Co., Combination Fraction M. Co., Combined M. & L. Co., Conglomerate M. Co., Connecticut Goldfield M. Co., Conqueror Gold M. Co., Coosichane M. Co., Crackerjack M. Co., Central Tonopah Golf'd M. Co., Daisy Annex M. Co., Daisy Extn. Annex M. Co., Daisy Ext. M. Co., Deane Group, Desert Chief M. Co., Detroit Con. Gold M. Co., Diamondfield Black Butte, Diamondfield Cons. M. Co., Diamondfield Carisa M. Co., Diamondfield Florence M. Co., Diamondfield Mk. Cons. M. Co., Diamondfield Red. Mtn. M. Co., Diamondfield Triangle M. Co., Diamond Valley Gold M. Co., Dixie Gold M. Co., Doctor Gold Mines Co., Doctor White Wolf M. Co., Eagle Group, Edwin B. Group, Ella Group, El Zagel M. Co., Empire Goldfield M. Co., Erb-Fagenbush Group, Erie Goldfield M. Co., Esmeralda Group, Fawn Goldfield M. Co., February Gold M. Co., Fissure Group, Florence Goldfield M. Co., Frances Group M. Co., Frances King M. Co., Frances Mohawk M. & L. Co., French M. Co., Frisco Goldfield M. Co., Goldfields M. Co., Globe Mining Co., Goldfield Acacia M. Co., Alabama M. & L. Co., Aloha M. Co., Alpine Group, Amethyst M. Co., American M. Co., Anchor M. Co., Apex M. Co., Aurora M. Co., Bank M. Co., Banner M. Co., Banner M. Co., Banner Min. M. Co., Belgrade M. Co., Belmont M. Co., Berkeley M. Co., Big Chief M. Co., Black Cat M. Co., Black Hills M. Co., Black Mtn. M. Co., Blue Bell M. Co., Bonanza M. & M. Co., Brooklyn M. Co., Bullion M. Co., Bull Dog M. Co., Burlington M. Co., Burnt Hills M. Co., Calico M. Co., Calumet M. Co., Canadian M. Co., Cape Nome M. Co., Central M. Co., Century M. Co., Chedd M. Co., Christmas M. Co., Circle M. Co., Cleary M. Co., Clover Leaf M. Co., C. O. D. M. Co., Columbia Gold M. Co., Columbia M. Co., Combination M. Co., Combing Nation M. Co., Commonwealth M. Co., Comstock Mines Co., Consolidated G. M. Co., Cons. Mines Co., Constellation M. Co., Daly-West M. Co., Daisy M. Syndicate, Diamond M. Co., Dominion M. Co., Dbl' Eagle G. M. Co., Dipper M. Co., Eastern Star M. Co., Eclipse M. & M. Co., Emancipator M. & M. Co., Emperor M. Co., Esmeralda M. Co., Ethel M. Co., Eureka M. Co., Excelsior M. Co., Favorite M. Co., Federal M. Co., Fissure M. Co., Florence Ext. M. Co., Fortune M. Co., Gold Bug M. & M. Co., Gold Elk M. Co., Gold Star M. Co., Great Bend M. Co., Hercules M. & M. Co., Hibernia M. Co., Highland M. Co., Horseshoe M. Co., Humboldt M. Co., Hummer M. Co., Ida M. Co., Independence M. Co., Joshua M. Co., Jupiter M. Co., Kabawgam M. Co., Kawich Explo. Co., Kewanas Ext. M. Co., Kewanas M. Co., Keystone M. Co., Ledge M. Co., Lombard M. Co., Lone Star M. Co., Lucky Boys M. Co., Lucky Star M. Co., Lucky Strike M. Co., Madonna M. Co., Majestic M. Co., Mascot M. Co., May Queen M. Co., M-B & I. Co., Meda M. Co., Midnight-Pawnee M. Co., Midway M. Co., Millrace M. & M. Co., Mineralwealth M. Co., Mint M. Co., Monarch M. Co., Monogram M. Co., Mtn. View M. Co., National M. & L. Co., Nevada Boy M. Co., Nev. Kimberly M. Co., Nevada M. Co., Nighthawk M. Co., Noble M. Co., Northern M. Co., North Star M. Co., Oakes M. Co., Ore Producing M. Co., Oro M. Co., Panhard M. Co., Portland M. Co., Quartz M. Co., Racine M. & M. Co., Rand M. Co., Red King M. Co., Red Lion M. Co., Red Mtn. M. Co., Reliance M. Co., Roanoke M. Co., Ruby Hill M. Co., Ruby M. Co., Sassy Sal M. Co., Secoya M. Co., Shepherd M. Co., Sierra M. Co., Sil. Pick M. & M. Co., Simmerone M. Co., Shoshone M. Co., Skylark M. Co., Sovereign M. Co., Souvenir M. Co., Starlight M. Co., Summit M. Co., Sunday M. Co., Sunrise Gold M. Co., Superior M. Co., Syndicate M. Co., Third Chance M. Co., Tom Boy M. Co., Tonopah M. Co., Treasure M. Co., Twin M. Co., United Mines Co., Utica M. Co., Venture M. Co., Verde M. Co., Victoria Mines Co., Victor M. Co., Vindicator M. Co., Virginian M. Co., Washington M. Co., Water M. & M. Co., White Rock M. Co., Wild Horse M. Co., Gold Bar Ext. M. Co., Bar M. Co., Bar Frac. M. Co., Beater M. Co., Belt Group, Button M. Co., Flat M. Co., Hill M. Co., Horn M. Co., King Group, Nuggett Group, Pick Group, Quartz Group, Quartz Group, Queen Ext. M. Co., Queen Mines Co., Ribbon Group, Ribbon Group, Seal Group, Golden Butte M. Co., Golden Cons. Group, Golden Rule Group, Goldfrog Big C. M. Co., Grandma M. Co., Great Bend Annex M. Co., Great Bend Cons. M. Co., Great Bend Ext. M. Co., Great Bend Frac. M. Co., Great Western Group, Greater Nev. Goldfields M. Co., Green Mtn. Group, Happy Hunch M. & M. Co., Hassell Group, Heart of Goldfield M. Co., Helena Gold M. Co., High Grade Group, High Ore G. M. Co., Home Trust M. Co., Hombre Group, Huddleston Group, Imperial Goldfield M. Co., Invincible Gold Mines Co., Islam M. Co., Joshua Man Gold M. Co., Jumbo Ext. M. Co., Jumbo Frac. M. Co., Kaiser Goldfield M. Co., Kampeska Group, Kansas City Goldfield M. Co., Katherine Goldfield M. Co., Kavanaugh Goldfield M. Co., Kendall Goldfield M. Co., Kendall Ext. M. Co., Kerr, J. E. et al Group, Keystone M. Co., King David G. M. Co., King Leopold M. Syndicate, Knickerbocker Gold M. Co., Knob Hill Queen M. Co., Lander Goldfield M. Co., Leathers & Woody Group, Lookout Goldfield M. Co., Lotus Group, Lou Dillon M. Co., Lou Dillon Montezuma M. Co., Magnet Gold M. Co., Magnolia Group, Majestic M. Co., Mammoth M. Co., Mansfield M. Co., Mary Jane Group, Maud De Haven Golf'd M. Co., Mayflower Gold M. Co., Mayne Goldfield M. Co., May Queen Ext. M. Co., McMahon Gold M. Co., Milltown M. Co., Milltown Frac. M. Co., Milwaukee Goldfield M. Co., Mohawk Annex M. Co., Mohawk Ext. M. Co., Mohawk Frac. M. Co., Mohawk Jr. M. Co., Montevideo Gold M. Co., Moose Goldfield M. Co., Moss, J. J. Group, Mt. Whood Group, Myla M. Co., Nancy Donaldson M. Co., Nell Ore M. Co., Nelson Gold M. Co., Nevada Amalgamated M. & L. Co., Nevada Eagle M. Co., Nevada Goldfields M. Co., Nevada Goldfield Red Co., Nevada King M. Co., Nevada Pearl M. & L. Co., Nevada Queen M. Co., Nevada Victor M. Co., Nevada Western M. Co., New Diamondfield M. Co., New Jersey Goldfield M. Co., New Mohawk M. Co., Norcross M. Co., North Goldfield Group, Oakland Goldfield M. Co., Old Gold Mines Co., Old Kaintuck Goldfield M. Co., Overfield Goldfield M. Co., Original Velvet L. & M. Co., Palace Goldfield M. Co., Pantheon Group, Panyan Goldfield M. Co., Parker Goldfield M. Co., Pennsylvania Corona M. Co., Pennsylvania Goldfield M. Co., Peterson Silver Pick M. & L. Co., Pittsburgh Nevada M. Co., Philadelphia Goldfield M. Co., Pocahontas Goldfield M. Co., Pollard Florence M. L. Co., Porphyry Dyke M. Co., Potlatch M. & M. Co., Potter Gold M. Co., Preble Mtn. M. Co., Preferred M. Co., Princeton Group, Quartzite Annex M. Co., Raccoon Group, Ralston M. Co., Rams Horn Group, Red Boy M. Co., Red Butte M. Co., Red Butte Gold M. Co., Red Hills M. Co., Red King M. Co., Red Mtn. M. Co., Red Mtn. Valley M. Co., Red Rock Group, Red Top Extension M. Co., Red Top Frac. M. Co., Rochester Goldfield M. Co., Royal Goldfield M. Co., Ruby Gold M. Co., Sandstorm M. Co., Sandstorm Ext. M. Co., Sangrade Goldfield M. Co., Seymour Groups, Siam Group, Silver Pick Triangle M. Co., Silver Pick Ext. M. Co., Spearhead Gold M. Co., Spion Kop Group, Spokane M. Co., Stamford Nevada Dev. Co., Standard M. Co., St. Ives Gold M. & M. Co., St. Louis Exposition Group, Sunnyside Gold M. Co., Talmage Gold M. Co., Togoni M. & M. Co., Trotter M. Co., Unity Cons. M. Co., Velvet Gold M. Co., Vernal Ext. M. Co., Vernal Mining Co., Vulcan Gold M. Co., Waverley Goldfield M. Co., West Mohawk M. Co., Wheeling Goldfield M. Co., Whippoorwill Goldfield M. Co., Wonder Goldfield M. Co., Yellow Rose M. Co., Yellow Tiger M. Co., Yellow Top M. Co., Zion Cons. M. Co.

A Matte-Separating Forehearth

By E. JACOBS*

The settler in use at the Tye Copper Company's smelting works at Ladysmith, Vancouver Island, B. C., is so constructed as to provide for a continuous flow of matte as well as slag; consequently the removal of the matte by tapping at intervals is obviated. This provision is simply an adaptation of the old Orford style of separator to a water-jacketed receiver, the receiver being of a much larger size than those formerly used. It is, further, an improvement on the Orford

the bottom, this space is filled in with chrome brick.

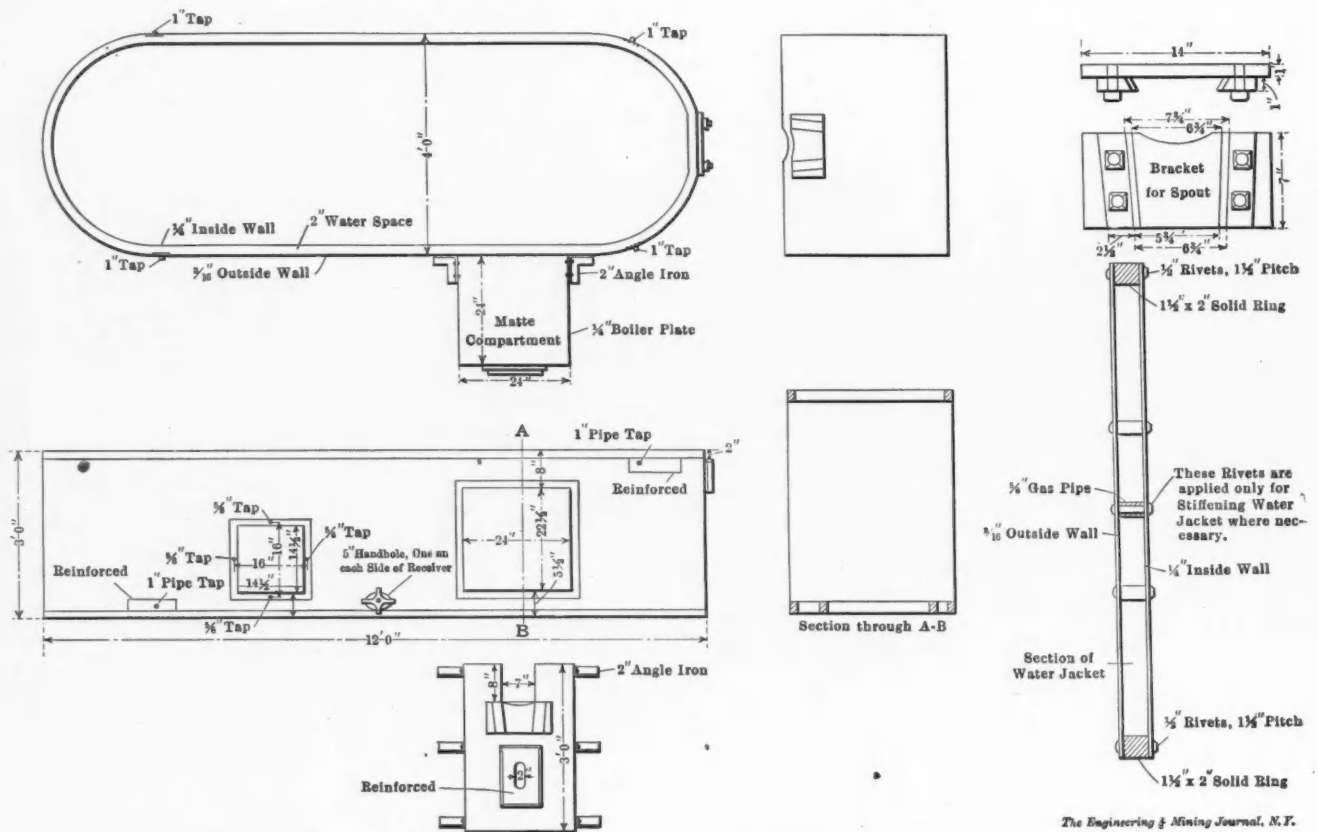
The level of the matte is controlled by regulating the height of the slag outlet. For instance, if it be desired to increase the flow of matte, a ball of clay is pressed into the slag spout; or to reduce it, this outlet is opened up. As nearly as practicable a depth of 10 in. of matte is maintained in the settler.

The size of settler ordinarily used at the Tye company's works is 4 ft. wide by 12 ft. long, but the construction of a much larger one is contemplated. This matte-separating arrangement has been in use here for three years, and so far as known to the manager of the smelter, W.

as in the ordinary tapping operation) and in the saving of tapping clay.

Platinum in Borax

J. G. Rose (*Chem. News*, Aug. 1908) in assaying various samples found traces of platinum, where such results were rather unexpected and he then proceeded to investigate the reagents used in the assays. The sodium bicarbonate having previously been examined for platinum, the borax and litharge were tested. The litharge was soon proved to be platinum free but not so with the borax. Further



DETAILS OF MATTE SEPARATING FOREHEARTH IN USE AT SMELTERY OF TYEE COPPER COMPANY, VANCOUVER ISLAND, B. C.

separator in that the matte compartment is placed outside the main receiver, so that in case of accident it is practicable to remove this part without interfering with the working of the furnace, since the receiver is also fitted with the ordinary tapping jackets, one on each side, for use in such an emergency until the necessary repairs shall have been made to the matte-separator compartment mentioned.

The matte compartment, the position of which is shown in an accompanying illustration, is 24 in. square and is lined with 8 in. of brick. The opening between the settler and this outside compartment is 24x22 in., but with the exception of a connecting channel 6 in. square, at

J. Watson, he was the first to use it in this way. It has been found to work very satisfactorily, so much so that during the three years the matte compartment has been frozen up only two or three times, and then because of the high zinc content of the matte, which sometimes was as much as 23 per cent. ZnS.

Among the advantages afforded by the use of this matte separator are the elimination of danger of men being burned when tapping, the much cleaner slag made (this causing a saving which in one month more than pays for the cost of installation), the economy effected in the services of a tapper being dispensed with in all of the three shifts, the reduction in the wear and tear of matte pots (the stream of matte not striking the side of the pot

tests showed the borax to contain 0.00013 per cent. platinum. Tests were then made to ascertain if this amount of platinum could be introduced into the borax through the fusing of the same in platinum vessels. These tests conclusively proved that fused borax has a very distinct action on platinum ware and platinum determinations made with borax prepared in platinum vessels should be viewed with suspicion.

Statistics compiled for THE MINERAL INDUSTRY show that there was an increase in the output of coppers in the United States during 1908 over that of 1907, amounting to 8563 short tons, worth \$94,193. The total 1908 production was 35,334 short tons, valued at \$388,674.

*Victoria, B. C.

California Oil and Asphalt Lands

SPECIAL CORRESPONDENCE

In the House of Representatives at Washington, Mr. Smith, of California, has introduced a bill (H. R. 9964) to provide for the disposal of lands chiefly valuable for oil and asphaltum. This has been referred to the Committee on Public Lands, and it is understood will be pushed next winter.

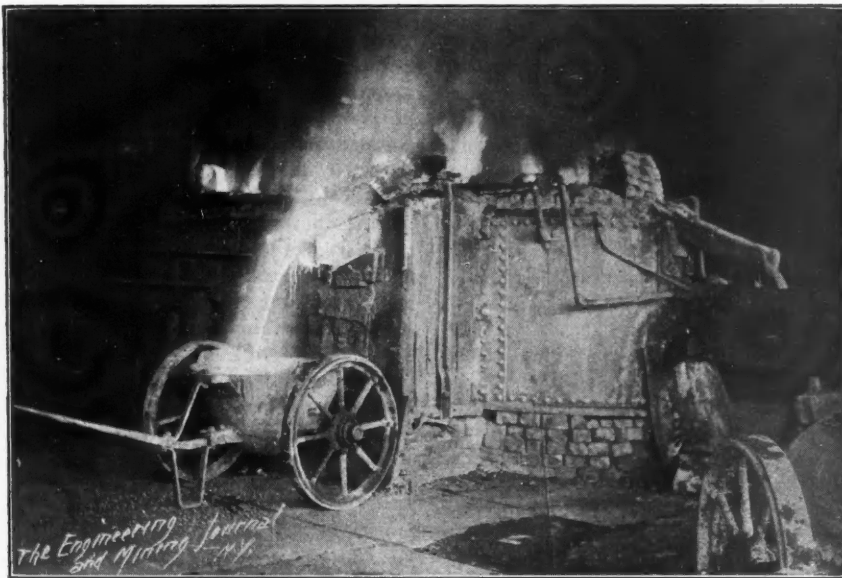
The bill provides that the public lands of the United States in the State of California chiefly valuable for mineral oil or asphaltum may be acquired under the provisions of the proposed act and may not henceforward be located as placer-mining claims. The bill then goes on to specify that any citizen, actual or intending, of the United States may file a declaration with the register and receiver of the land district, wherein is situated the land that he

phaltum in commercial quantities, etc.; but it is further provided, "that if there are any veins or lodes of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits known to exist at date of filing such application for patent, title thereto shall not pass under any application, entry, or patent under the provisions of this act, but are hereby expressly declared to be reserved therefrom, and such known veins or lodes shall be subject to location and entry by any qualified person or persons under the provisions of the existing United States mining laws applicable thereto; provided, however, that any declarant who discovers any vein or lode bearing asphaltum, gilsonite, elaterite, or other like substances within the limits of the land included in his declaration or entry under this act shall have the preferential right for a period of 90 days after discovery of such vein or lode within which to locate the same under the provisions

of the public interest." In replying to the resolution, Secretary Ballinger, however, finds that it is incompatible with the public interest to make known the whole report, and he, therefore, transmits, as noted, merely the conclusions. The reasons which have led him to hold back the bulk of the report are that the investigation was undertaken largely with a view to the better planning of the work of the Geological Survey in this country. With this in mind it was intended that the data should be held confidential, and assurances to that effect were given to the owners of the Mexican oil wells. Mr. Ballinger points out that at present mines and other natural resources in private ownership are open to inspection by Government agents, and that it is extremely desirable they should continue to be so. This, however, cannot be the case unless the good will and confidence of the miners in the intentions of the Government are maintained, barring, of course, the possibility of legislation compulsorily opening the mines to government examination.

In presenting the conclusions arrived at by Mr. Hayes, Mr. Ballinger says that while the Mexican fields promise to yield a large quantity of crude oil, its quality is such that it cannot compete under present conditions in the markets of the United States or Europe with the higher-grade petroleum of the Appalachian, Illinois, or Mid-Continent fields. Further, the conditions are such that the demand for fuel oil and refined products in Mexico exceeds the supply available at present, or in sight. There is little coal in Mexico, and the railroads, now dependent chiefly on Texas, Oklahoma and English coal, could consume several times the present production of oil if it were generally adopted as fuel. The increased production in the Mexican fields, therefore, will affect the United States by reducing the demand for coal, by reducing the demand for high-grade crude oil in refining to supply the local market, and to some extent by competing in the European market with American refined products. Finally, the conditions in the Mexican fields are found to be unfavorable to the small operator, and it is regarded as highly probable that production as well as refining will remain in the hands of a few strong companies. The geological conditions under which the oil occurs are such as to increase the hazards and uncertainties encountered in the development of an oilfield, and it is probable that both the difficulty of securing a steady supply of oil and the average cost of production will be correspondingly increased.

In 1908 the production of chrome ore in the United States, as shown by figures collected for THE MINERAL INDUSTRY, was 280 long tons valued at \$5600. This was a decrease from the 1907 production of 335 long tons valued at \$5620.



MATTE-SEPARATING FOREHEARTH IN USE AT TYEE COPPER COMPANY'S SMELTERY AT LADYSMITH, VANCOUVER ISLAND, B. C.

intends to claim, that he intends to improve the land for oil or asphaltum, describing the land in a tract not exceeding 160 acres. In no case shall a claim be more than one mile in length. Upon filing the declaration the declarant shall pay the receiver a fee equal to 25c. per acre. Nothing, however, is to abridge the right to enter the lands subsequently for the purpose of discovery and development of metalliferous minerals, or the assertion of a mineral claim thereto. Neither shall the proceedings give to the claimant before patent the right to the surface of the land for agricultural, grazing, or any other purpose, nor the right to take wood from the surface of the land. At any time within three years the claimant may make application for patent and the application shall show that drillings have been made to produce oil or as-

phaltum in commercial quantities, etc.; but it is further provided, "that if there are any veins or lodes of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits known to exist at date of filing such application for patent, title thereto shall not pass under any application, entry, or patent under the provisions of this act, but are hereby expressly declared to be reserved therefrom, and such known veins or lodes shall be subject to location and entry by any qualified person or persons under the provisions of the existing United States mining laws applicable thereto; provided, however, that any declarant who discovers any vein or lode bearing asphaltum, gilsonite, elaterite, or other like substances within the limits of the land included in his declaration or entry under this act shall have the preferential right for a period of 90 days after discovery of such vein or lode within which to locate the same under the provisions

Mexican Oilfields

SPECIAL CORRESPONDENCE

In response to a resolution offered some days ago by Senator Cummins, of Iowa, and subsequently passed by the Senate, the Geological Survey has sent to the Senate through the Secretary of the Interior a digest of the conclusions arrived at by C. W. Hayes, chief geologist, in a tour of the Mexican oilfields. The Cummins resolution made request for the full report of Mr. Hayes with, however, the usual proviso, "if not incompatible with

Mining for Gems in Brazil

By A. S. ATKINSON*

In the past few years several American companies have been organized for mining operations in Brazil with the chief object in view of working some of the old abandoned mines and opening up new ones that yield gems suitable for the jewelry trade. These gems are profitable for that large trade in cheap jewelry which has steadily expanded in recent years in this country, and Brazil offers a fertile field for obtaining the raw material. The trade is naturally influenced materially by the caprices of fashion, but generally speaking the demand is fairly constant for tourmaline, garnets, agates, rock crystal, amethysts and topazes.

The superficial deposits of most of these gems have been exhausted in this country, and the difficulty of mining for them at greater depths has increased their value. In most of the mining regions of Brazil the stones are still near the surface, and in many parts they can be extracted without great work or difficulty. Another difficulty in mining for American gems of this nature is that most of the perfect stones have been mined, and those remaining are for the most part either small or marked with some flaws; also the perfectly colored stones are getting rarer every day, even those most suitable for the ordinary jewelry trade.

These conditions of the market supply determined the American companies to turn their attention to Brazil as a wide field offering profitable returns. The results of this investment have not been without good returns and some excellent experience which may lead to more important developments in the future. Mining in Brazil by the natives is still in a primitive condition, and it is only outside capital and brains that develop the mines to any important extent. Brazil has for years been exporting these gems, but they were obtained chiefly through desultory work in picking them up from the surface. Yet in the mining regions good stones can be found a short distance below the surface by expert miners.

TOURMALINE MINING

Mining for tourmaline is one of the most important industries of Brazil. In reality, however, the deposits have only been superficially worked. The tourmaline zone is quite extensive, extending from Itamarandiba and running northeast as far as the Piahy river, a branch of the Arassuahy, and thence west and northwest as far as Boqueirão, and San Antonio das Salinas. In the municipal districts of the Theophilo Ottoni and Aras-

suahy there are about 800 persons engaged in mining for tourmaline alone. The stones are found throughout the lower basin of the Arassuahy and in the valley of Rio Doce, also along the rivers Itambacury, Urubú, Setúbal and Caihao. The gems are found in the veins of granite, quartz, pegmatite and gneiss along the river banks and are washed out and picked up by the miners in considerable quantities.

At Theophilo Ottoni an active mine is in operation, and systematic work is done to extract the gems. The deposits occur in a forest under a layer of earth several feet deep. The layer of earth is removed, and the stones are then found in a bed of gravel. The stones found here are of an ordinary bottle green, and hence are not very valuable, but the quantities in which they are found makes the work profitable.

Much better tourmalines are extracted from the big mine of Larangeiras at Arassuahy in the district of Itinga. This mine has been successfully operated for about nine years, and the supply of stones continues good. Perfectly transparent green tourmalines are found here, and they command good prices. At San Miguel not far from this mine the blue and red varieties of tourmaline have more recently been unearthed. Unfortunately few of these are found to be perfect. The red ones invariably show flaws and the blue ones are not transparent. Most of these stones are traversed by cracks which practically spoil them for the best jewelry purposes. Some of these stones are of unusual size, and in spite of the flaws they can be cut advantageously into a number of smaller ones.

Good red tourmalines are in fair demand in this country at prices which make their mining profitable. A mining company composed of natives and Americans has been in operation on the Piahy river for the past two years, and some very fair specimens of red tourmalines have been received from them. The coloring of a tourmaline determines its price, as much as its flawlessness. Clear rich transparency and beautiful coloring makes a small-sized tourmaline more valuable than one twice the size but lacking in color and transparency.

AQUAMARINES

Some fine aquamarines have been mined in various parts of Brazil, and one a few years ago was taken from a mine near Arassuahy that weighed nearly six pounds. The record, however, was one that weighed 15 pounds. It was of the green variety and was mined as far back as 1814. This stone was eventually cut up and dispersed. We have the authority of Eschwege that it weighed 15 pounds, but that is all. If the stone was of such a size and correspondingly perfect and well colored it is a pity that it was not preserved intact. Some very large

and handsome aquamarines are obtained today from the Brazilian mines, and one American company has exhibited several specimens of remarkable coloring ranging from half a pound to several times this weight. The best aquamarines, however, come from the island of Alegre. Beautifully colored aquamarines are found there in crystals of great lustre. These are exhibited at the different ports of Brazil to visitors to show them the richness of the gem deposits of the country. Frequently prospectors are deceived as to their origin, and they are induced to make extensive searches for similar stones in the tourmaline districts.

Many American prospectors are today going into Brazil with the idea of locating gem mines, and the need of accurate information is essential. Like all other mining countries, wonderful stories may be heard about picking up priceless Brazilian diamonds, topazes, and amethysts. But like all such stories they generally simmer down to only a very small grain of truth. On the other hand the government of Brazil has so little accurate knowledge of its own mining resources that the prospector must often follow ordinary rumors to get anywhere.

As fashion dictates the value of stones to a large extent, the miner for gems must consider the vagaries of a fickle market; but most of the stones of commerce sooner or later come into fashion again after having passed through a temporary eclipse. Amethysts have not been in as active demand as tourmalines and aquamarines for some time, but they are pretty sure to return to a fair state of popularity. The mining of amethysts has suffered a decline in Brazil as a result of this change in fashion, but good ones are always in demand. Similarly mining for topazes is conducted on a small scale in Brazil, but a revival of interest has been manifested in the mines in the last year.

TOPAZ MINES

The old mines of Boa Vista and Seramenhain in the basin of the Arassuahy river, have been reopened by a new company, and some beautiful topazes are being obtained. The old open-cut method of mining has been abandoned, and deep mining is carried on with success here and at Jose Correa and Caxambu. The gems are extracted from a gravel bed about 20 ft. deep. The topazes show a great variation in coloring and size. Some are small and full of flaws, and others changing from a pale yellow to a deep rose shade and so large and transparent that they are of the greatest value. There is exhibited at the national museum at Rio Janeiro a topaz mined at Ouro Preto in the basin of the Jequitinhonha river that weighs almost 2000 grams. But its size is not more significant than its beautiful color, perfect transparency, and absolutely flawless condition. It was

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one of the handsomest gems ever mined in Brazil or any other country.

There is a yellow quartz which comes from the state of Goyaz which resembles the topaz and is largely exported to meet the demands of the cheap jewelry trade. Thousands of stones in use which pass as topazes are only yellow quartz. It is mined on a large scale in Brazil and has really hurt the topaz miners. There is another gem occasionally found in the topaz mines. It is a hydrous silicate of aluminum and glucinum, and known as euclase. This is of a pale blue or green color and of vitreous lustre. It is a stone of considerable rarity and value, and its presence is always welcomed by miners. There is a special demand for good specimens for museums, as well as for the better class jewelry trade. The best specimens of euclase have been mined at Boa Vista and Capao do Lana.

AGATES AND OTHER GEM MINERALS

Agates, garnets and rock crystal are obtained in considerable quantities from many parts of Brazil, but the size and quality of the gems are not always satisfactory. The garnets are obtained chiefly in the valley of Santa Maria, a branch of the Calhao river, and along the shores of the tributaries of the Urubú river. They are rather small and belong to the varieties known as pyrope and almandine. The stones are of a dark red, and if larger they would have more general demand.

The agates of Brazil run from chalcidony to onyx and are quite abundant in Rio Grande do Sul and several other districts of the country. In the neighborhood of Uruguayana there are some of the richest beds of agates in the world. The beds stretch over a large area and the supply of gem stones is abundant, but it is the coloring and size of the stones which make them so attractive. They come in wonderful carnelians of a deep red color, and some of them are of unusual size and flawless beauty. Large quantities of these agates are sent to Germany; thence they find their way into this country in jewelry.

The best rock crystal and quartz are found in the famous mountain Cristaes in the State of Goyaz. The rare specimens extracted and cut for the trade indicate the output of these mines. In spite of the fact that the mines have been worked for many decades, the output is large today and many deposits, not located or worked, still await the prospector.

The chrysolites in spite of their beautiful yellowish green color are not of much value as gems today but these minerals are found in the valley of the Gravata river in the most wonderful abundance. They are really decomposed chrysolite and called by the miners *cambalaxo*. The stones are found in gravel deposits along the river and were formed by the decomposition of the quartz veins that traverse the gneiss rocks. The stones are

beautiful and should be of use in certain branches of the jewelry trade.

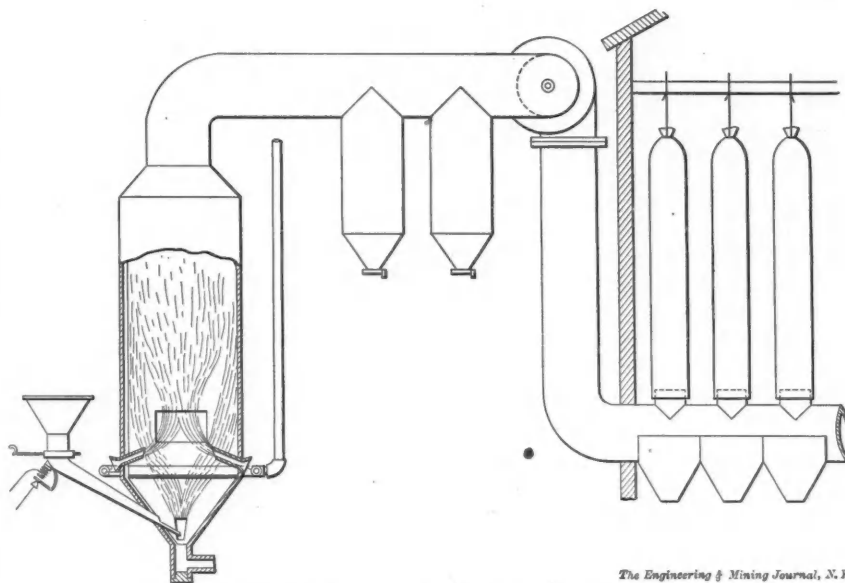
GENERAL CONDITIONS

Unfortunately most of the gems found in Brazil are subject to an export tax which makes their marketing outside of the country less profitable. This tax varies with the stones, but it is not usually of a prohibitive nature. Very fine specimens could be shipped away with great profit, but the common stones would hardly pay. Gem mining has in the past decade become a profitable industry in many parts of the world, and the enormous demand by the cheaper jewelry trade for stones which can be utilized for ornament at no great expense has stimulated prospectors to study carefully profitable fields of exploitation of such stones as those mentioned.

part they are content to scratch the surface of the land or dig a few inches into the gravel beds for the stones and if not uncovered, they pass on to new regions.

Oxidizing Furnace for Pulverized Ores

L. S. Hughes, of Joplin, Mo., describes (British Pat. 16,521 of 1908) a furnace for oxidizing pulverized ores which are carried through the furnace chamber by an air blast and maintained at a comparatively low temperature preventing their fusion, or the decomposition of substances in the ore that would injuriously affect the product. The accompanying illustration shows a sectional elevation of



The Engineering & Mining Journal, N. Y.

OXIDIZING FURNACE FOR PULVERIZED ORES

Diamonds, rubies and the more precious gems are not considered in this paper, for they are of comparatively rare occurrence, but tourmaline, aquamarines, topazes, amethysts, garnets, agates and rock crystal can be mined systematically in restricted areas at a good profit. They form the basis of the cheap jewelry trade and must continue to improve in value as new methods of using them are invented. Mines that will yield an abundance of such stones regularly cannot fail to prove profitable in the long run, much more so in many respects than a mine where only the more precious gems are occasionally found.

Brazil offers a field for gem mining that is only partly understood, and, one might say, only half explored. Within its great mountainous stretches of mining land there must be wrapped up treasures in the form of precious and semi-precious stones. The native population is slow to realize and slower to adopt modern methods of mining for these products. For the most

the furnace, with the cooling flues and screen system indicated diagrammatically. The furnace chamber is preferably upright with an inverted conical bottom, and is of unlined sheet iron. In the bottom near the apex are openings for air to enter and for extracting unburned and inert particles of the ore, while at the apex is an air pipe for supplying compressed air to the furnace.

Around the lower part of the furnace chamber is a gas-burner ring provided with nozzles which are inclined upward so that the flame issuing from them will not impinge upon oppositely disposed tubes. The pulverized ore is fed into the hopper at the side and then passes into a chute with a trough-like end projecting nearly to the center of the furnace, so as to deliver the ore directly into the air jet. Below the hopper is a gate for regulating the feeding of the ore, and on the outside of the chute is a rapping or vibrating device for keeping the hopper and chute in a state of vibration.

A Novel Coal and Stone-Cutting Process

A System Based on the Use of Driven Cables Carrying Tempered Steel Cutting Points, Whereby a 50 Per Cent. Saving Is Possible

BY ALFRED GRADENWITZ*

The coal- and stone-cutting process here described, was invented by Messrs. Neukirch and Freytag, and is being rapidly adopted by German and foreign mining concerns, on account of its low-working expenses and simplicity of operation. It is true that the lower officials entrusted with the immediate superintendence of the process have to undergo a thorough training to account for the local conditions of the mine, but no skilled labor is required for the process itself.

The system is based on the use of cables carrying tempered-steel cutting points, the cables being driven by either one or two machines. The cutting machine represented in the accompanying illustrations is 36 in. in height, 40 in. in width and 8 ft. 4 in. in length, its capacity being 11.5 h.p. It is designed for electrical operation, but is readily adapted to compressed-air operation by some slight alterations in its construction.

The arrangement used in the case of electrical operation is represented in Figs. 1 and 2, and the one adapted to compressed-air operation in Figs. 3 and 4; general views of the electrically-operated machine are given in Figs. 5 and 6. These machines are from 1000 to 1500 lb. in weight, according to their size and type.

THE CUTTING MACHINE

The cutting machine mainly consists of a double-groove winch with automatic tightening gear. The wooden sheaves, which are generally arranged vertically, may also be installed in a horizontal direction below the machine, if this be more in agreement with local conditions. The tightening gear will carry the machine forward while forcing the cutting cable against the coal seam, but the pulling power of the machine is never exceeded. When the cable reaches any harder coal or rock, the speed of the tightening gear is slackened in proportion.

The machine comprises a base frame, on which are mounted the motor, toothed-wheel gearing and shafts of the wooden cable sheaves. The driving sheave is provided with two grooves and is about 32 in. in diameter, while the opposite wooden sheave, which has only one groove, is not driven.

The cutting cable, after passing over one of the grooves of the double sheave, goes on to the opposite single sheave and back again to the second groove of the driving sheave. The cable travels at a

speed of 5 ft. 8 in. per sec., or about 340 ft. per minute.

DESIGN OF CABLE

As regards the cutting cable itself (Fig. 7), this, in the case of small-size machines, is $\frac{3}{8}$ in. in thickness. The following varieties of cable, selected after several years' experiments, are used:

1. Cables made of triangular steel wire or wound with a sheath of such material. As this wire is braided, it obviously cannot be of hard steel. Such cables are of relatively high cost and are used only in the case of soft coal.

advantage of this design is that the edges are too easily bent down again. These caps can also be designed as files, and another process consists in braiding the steel points with the wire, according to the spiral lines of the latter, so as to work from all sides of the cut as they advance. The type of cutting tool represented in Fig. 7 is the one preferably used.

Next as regards the cutting process itself, three varieties should be distinguished:

1. *The revolving cable process*, according to which the cable, lined throughout its length with knives or other cutting

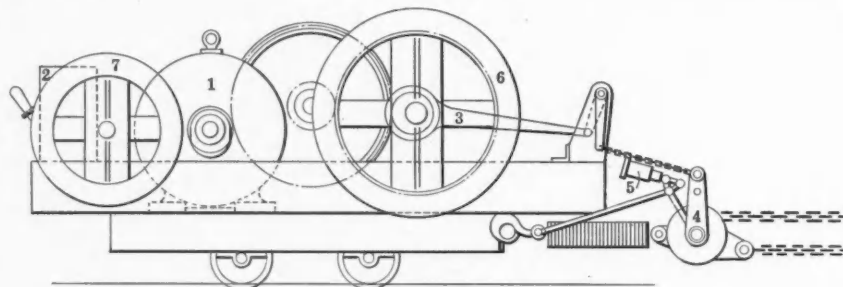


FIG. 1. ELECTRIC DRIVING MACHINE

1. Motor
2. Starter
3. Eccentric for driving No. 4.
4. Cable Tightening Gear
5. Regulating Device
6. Cutting Cable Sheave
7. " " "

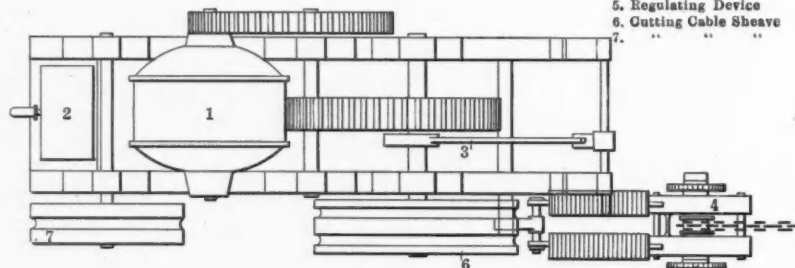


FIG. 2. TOP VIEW OF ELECTRIC CUTTING MACHINE

2. Another type of cable is fitted with two steel caps $\frac{1}{8}$ in. thick and about $2\frac{1}{2}$ in. long. Each cap has eight holes, into which triangular points of high-class tempered tool steel are inserted. These cutting points are prevented from falling through the holes or getting forced into the cable by a thin piece of steel sheet, which is placed between them and the cable (Fig. 7). The two caps are fastened to the cable by two rivets, which part the strands of the latter. There is said to be absolutely no slipping of these cutting parts, which are placed on the cable at about 2-ft. intervals.

In another type of cutting cable these caps have slots, the edges of which are bent up and tempered. However, a dis-

tools, is made to turn around the pillar of coal.

2. *The reciprocating cable process*. The same machine, as above described, can be used in connection with this process, but there is a special switching device which has to be regularly adjusted. This adjustment can, of course, be made automatic. In the case of this process, only a small portion of the cutting cable, viz., that coming into contact with the coal seam, need be lined with cutting tools.

3. *A process consisting in making two separate cuts* (at the top and bottom of the pillar, respectively). This double process will be necessary only in the event of the coal being particularly hard, so that it does not break loose and fall down of

*Engineer, Berlin, W. 50, Regensburgerstr. 3.

its own accord if a cut is made only at the bottom, or if the hole swells. Two small machines, arranged in each of the parallel passages, respectively, are preferably used in connection with this process. While Jeffrey machines can be converted with a view to their being used in this connection, this conversion will be worth while only in order not to shut them down entirely. However, the original Neukirch-Freytag machine has been found far more practical and economical in operation.

or cables run, that is, at the top and bottom. On the other sides of the pillar, guide rollers should be provided. In connection with revolving cables, wooden rollers are preferable, but for reciprocating cables iron rollers are found more suitable.

In the case of the revolving-cable process, the machine should be adjusted toward the lower part, so that the cable may have a tendency to remain near the ground, if the bed of coal be inclined at an angle. If, on the contrary, the ma-

produce any noise nor raise any dust, while all blasting work is dispensed with. The wear and tear of the machine is far less than in the case of other constructions, the revolving parts of it being free from any coal-fragment impurities. Before proceeding to the final stroke, any other work can be carried out without interfering with the cutting process. Again, there is no interruption in the cutting work during the removal of the coal, and finally, the process allows any hard rock to be rapidly cut through.

CAPACITY OF MACHINE

As regards the capacity of the machine, 172 sq.ft. of coal have been cut, according to testimonials of the Deutscher Kaiser mine, at Hamborn, in Germany, under rather unfavorable conditions. The coal there is of moderate hardness and a triangular cable was used in cutting. The type of cable lined with two steel points would obviously have given still better results.

Supposing the case of a quadrangular wall, 30 ft. in width and 90 ft. in length, a cutting cable of $2 \times 30 + 2 \times 90 = 240$ ft. in length would be required.

The output of the machine above described is 300 ft. per min., or 18,000 ft. per hour. The width of the 30-ft. wall to be cut would accordingly be dealt with by the cutting points 600 times within its width. Supposing the cable to penetrate only $\frac{1}{8}$ in. on passing over moderately hard coal, it would have penetrated to a depth of 6 ft. 3 in. in one hour, which, in the case of a 30-ft. width, would mean an area of about 187 square feet.

It may be said that these figures are by no means exaggerated, outputs of the same area of magnitude having also been obtained in the Zwickau district. However, on the basis of only 172 sq.ft. per hour, as in the case of the Deutscher Kaiser, a cut of about 1080 sq.ft. would still be obtained for each shift, even in the most unfavorable of cases and allowing for any possible stoppage.

If the coal wall be 4 ft. 10 in. in thickness, a coal volume of 5300 cu.ft. would be obtained, which, supposing 1 cu.ft. to correspond to a weight of 60 lb., would result in 159 English tons per shift.

A maximum of three men is required to operate the machine. In order to utilize the machine to the best advantage, it would have to be installed in such a way as to allow one wall to its right, and a similar one to its left, to be prepared and to be surrounded with a cutting cable. If, then, the working of the right-hand wall for some reason or other should have to be temporarily discontinued, the cable of the other (left-hand) wall will be applied in a minimum of time, thus immediately continuing the hewing work.

CABLE CUTTING IS LESS EXPENSIVE THAN BY CHAIN MACHINE

The wear and tear of cutting cables

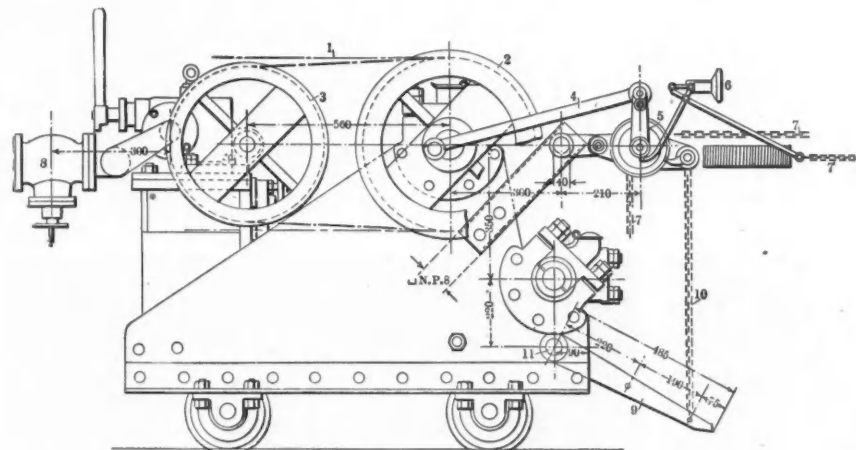


FIG. 3. COMPRESSED-AIR CUTTING MACHINE

Legend	
1	Cutting Cable
2	Driving Sheave
3	Timing Sheave
4	Driving Bar for Cable Tightening Gear
5	Cable Tightening Gear
6	Hand Wheel for Controlling Cable Tension
7	Tightening Chain
8	Safety Valve
9	Cam, to prevent Backrun on Rupture of Cable
10	Suspension Chain
11	Cam Rod
12	

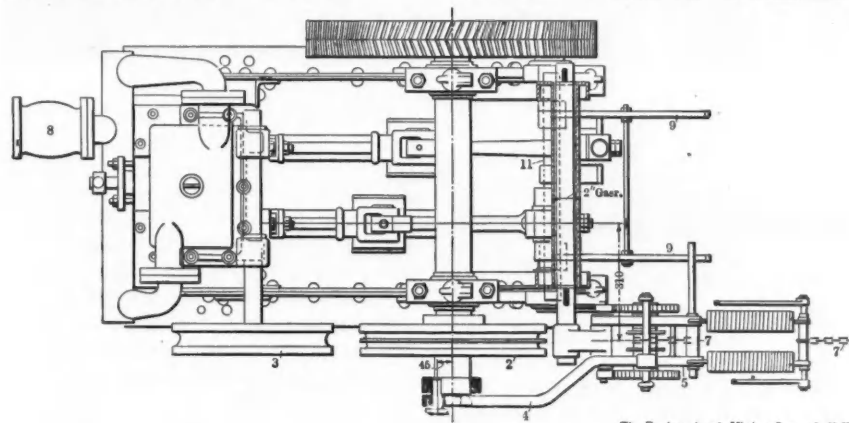


FIG. 4. TOP VIEW OF COMPRESSED-AIR CUTTING MACHINE

The machine should be installed in a side passage where no winding is done. It runs on a track of rails. The tightening gear should be firmly attached at a proper distance, and, as above stated, serves to draw the machine along with it, as the cable penetrates more and more into the seam of coal.

The cutting cable, according to the above, should be applied to the grooved sheaves, and according as it is either revolving or reciprocating, should be arranged to fit the conditions of each case.

In order to provide for an adequate guiding of the cable, it is well to break its cut a little at the corners where the cable

chine be placed high, the cutting cable will be apt to climb.

ADVANTAGES OF THE SYSTEM

As regards the advantages claimed for this process, it should be stated that the machine, being installed out of the way of the haulers, never interferes with their work, nor is it ever exposed to any risk of being damaged or crushed by falling coal.

The amount of energy required to work the machine is far less than in the case of any other system, and the machine is far simpler in construction and cheaper in operation. Furthermore, it does not

lined with two steel tapes is far less than that of triangular cables, and the cost of wear for each ton of worked coal is thus quite immaterial. In fact, this item will be far smaller than the wear of wheel and chain machines, whose teeth, owing to the greater height of their cut, have to perform a far greater amount of work. For a similar reason, the power consumption in the case of cable cutting will be far less than when using wheel and chain machines.

According to the American practice in the working of walls, pillars are partly left. Now, the cutting process above described will also be found of excellent use in the case of this special method, which, of course, differs from the German practice.

The following data are derived from an original estimate in meters and in round figures, which, in order to avoid

sq.m. per shift (as it is, it will yield 30 to 40 per cent. more in the case of an adequate use), four shifts of three men each will be required for this treble hewing, amounting to 12 shifts at \$4 each, or a total cost of \$48. The wages to be paid in working the rooms (above described) will, accordingly, amount to \$80. Even in case the foot-wall had to be cut, the outlay will never exceed \$100.

According to present coal-cutting methods, using other types of machines, wages would work out as follows: Each room contains $30 \times 10 \times 1.50 = 450$ cu.m. of minable coal at 1.5 tons each, that is, 675 tons. According to American data, the performance of each workman would be 6 to 10 tons, or an average of 8 tons each.

An aggregate of 84 shifts ($\frac{675}{8}$) at \$4 each would, accordingly, be required,

Proceedings of the Mine Inspectors' Institute

SPECIAL CORRESPONDENCE

The second annual convention of the Mine Inspectors' Institute opened on Tuesday afternoon in Scranton, Penn., there being about 50 mine inspectors from various parts of the country present, many of them having come long distances at their own expense to attend the convention, and one at least coming 2000 miles.

The president of the convention, George Harrison, chief mine inspector of Ohio, in his opening address to the convention explained the object for which the institute was founded a year ago. He said that while the mine inspectors were without an organization, anything like concerted

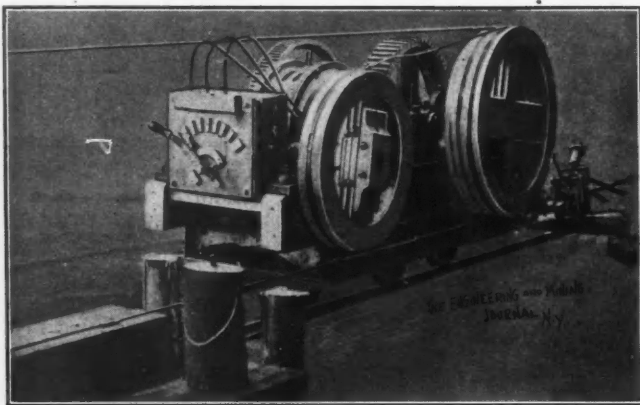


FIG. 5. GENERAL VIEW OF ELECTRICALLY-OPERATED MACHINE

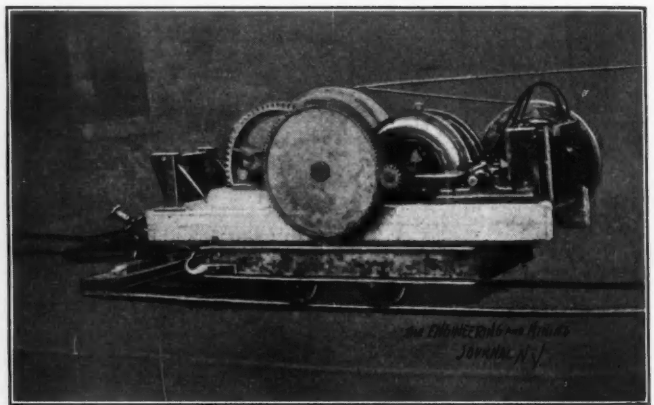


FIG. 6. SIDE VIEW OF MACHINE WEIGHING LESS THAN 1500 POUNDS

any complication, have not been converted into their English equivalents.

THE COST OF CUTTING

Supposing the "room" to be hewn is 30 m. in length and 10 m. in width, the coal reaching to a height of 1.5 m.; one hole (from one way to the other) would have to be bored at each of the four corners, and these holes will presumably be completed by two men in two shifts. However, for this operation, allowing a time twice as long, that is, $2 \times 4 = 8$ shifts at \$4 each, this will figure up to a total cost of \$32. Some workmen should be trained for the special work of boring such holes, and these men will always have to be in advance with their work.

The process of cutting these "rooms" will then be as follows:

After passing the cable through the upper and lower holes, the coal should at first be cut in a vertical direction, after which the bottom of the foot-wall, and eventually the other side, should be cut vertically. The two vertical cuts will result in $2 \times 30 \times 1.50 = 90$ sq.m., and the cut on the foot-wall is $30 \times 10 = 300$ sq.m., working out at an aggregate of 390 sq.m. If this machine be able to cut 100



FIG. 7. GENERAL VIEW OF CUTTING CABLE

amounting to \$336 in wages, that is, to \$200 in excess of the amount corresponding to the novel method here described.

Calcium chloride is a grayish-white substance, which has the power of strongly attracting moisture from the atmosphere, and of holding same. When used to dampen dust on coal-mine roads, it contains nothing that can be injurious to the miner, roadways, haulage-ropes, etc. It does not give off any smell or gas. Comparing its hygroscopic property with salt, salt of itself has not the power of attracting moisture, but owes what little power it does possess to a small amount of impurity which it contains in the form of magnesium chloride, and cannot be for one moment compared with calcium chloride, as a moisture-attracting substance.

action was impossible. The loss of life, the speaker said, had increased and was increasing in the mines, in many instances, at least, without justifiable cause. This was so not in one mining State or two, but throughout all the States in which coal measures were found. Now the object which the Mine Inspectors' Institute had placed before them, and which they would try to realize, was to minimize the loss of life in the mines by minimizing the dangers of mining as far as they could effect it. How was that to be accomplished? According to the speaker, this could in a considerable degree at least be effected by an interchange of ideas among the mine inspectors. This interchange of ideas could be conducted only through an organization such as they had founded 12 months ago at Indianapolis. At that convention there were 45 mine inspectors, but since that time the membership of the Institute had considerably increased, and with the increase of numbers came an increase of influence in each State and throughout the United States.

One of the results of their Indianapolis convention was the foundation of the testing station at Pittsburg, established by the United States Government at a cost of

\$150,000. They must strive to make not only the Federal Government interested in the safety of life in the mines, but they must try and make the State governments interested also. None of the State governments had so far erected experimental or testing stations, such as were common in the mining centers of Europe. They must also, he said, interest the large operators in these matters to a greater extent than is the case now. That was their mission, and in brief, this was the manner in which they hoped to carry it out. He was disappointed at the failure of the bill in Congress to establish a bureau of mines and testing stations.

After the president's address the convention went into session, and for the greater part of the evening was occupied with the selection of committees and other routine matters.

The following committees were appointed: Executive committee, H. D. Johnson, Pennsylvania; Peter Honrags, Oklahoma; Albert A. Sams, Indiana. Committee on constitution, John Verner, Iowa; W. H. Turner, Ohio; Thomas Moses, Illinois. Committee on resolutions, Thomas K. Adams, Pennsylvania; P. A. Grady, West Virginia; Thomas Hudson, Illinois. Membership committee, Clarence Hall, District of Columbia; J. T. Beard, Pennsylvania; J. L. McDonald, Ohio.

In the evening a social and smoker was given, but so far from the affair being preoccupied with merely musical or social functions, on the contrary, it was technically most interesting, four important addresses on mining matters being delivered, as well as an address of welcome by Judge H. M. Edwards, of Lackawanna county, in the absence of the Mayor of Scranton.

President Harrison delivered a second address, in which, after reiterating the purpose for which the meeting was called, the purpose for which the Institute was formed, and a few allusions to the welcome which the city of Scranton had extended to the delegates, he plunged into the duties of mine inspectors and the conditions that lead to the loss of life in the mines. He declared that the time had come when miners and operators must lay aside their bickerings and disagreements and work in concert for the good of all who were employed in the mines, or who drew a revenue from them. He asserted that 55 years ago when he first became a working miner, the miner took pride in his employment; that he kept his chamber clean; that he never blasted coal unless he had first cut each side of the block of coal that he intended to bring down and made a clean cut underneath. "But mining at the present day," said the speaker, "is a lost art." Take any "Tom, Dick, or Harry," place a keg of powder under one arm and a large auger under the other, and let him become a member of the United Mine Workers' Union, and you have a full-fledged miner, and a

dangerous one to himself and all his fellow workers.

A CURRENT OF 500 VOLTS IS DANGEROUS

The speaker called attention to blasting, and particularly to the new conditions involved in working the mines with electricity. He deprecated the use of high-voltage electrical currents, and declared that many of the fatal accidents in the mines were due to this cause. A voltage of 250 was said to be fairly safe, but when it was raised to 500 there was no such safety, and furthermore, the amount of coal that could be cut by doubling the voltage was only 10 per cent. more, as a general rule. The operators were indifferent, Mr. Harrison said, because they thought that by higher voltage there was more expedition, and the coal cut was as good. Mr. Harrison said that he did not believe in insulated wires; owing to the minerals in the water, dampness and one thing or another, the insulation became both defective and deceptive. When a miner took hold of a wire that was supposed to be insulated, but which was not so in fact, a fatal accident occurred. He also said that more care should be taken in installing electric wires, which were sometimes strung anywhere and anyhow as if they were so many hemp ropes.

J. H. Taylor, of Illinois, in the course of a somewhat lengthy and discursive address, warned the inspectors to beware of what he called the "theoretical fellow;" he also advocated the employment of the acetylene lamp in the mines, which, he declared, burned clearly and brightly when the ventilation of the mine itself was dangerous to human life, and that oxygen was not so essential to the illumination of the acetylene lamp.

J. H. Holmes, of the United States Geological Survey, in the opening of his address said that he had heard that morning that there was an undertakers' convention also being held in Scranton, and that he hoped, although the undertakers of the country had about 1000 fewer mineworkers last year to lay underground than they had during the preceding year, that the conventions would not be the less friendly, as both were underground diggers. Reverting to the warning given by Inspector Taylor to beware of the "theoretical fellow," Doctor Holmes said that theory and practice in any effective undertaking usually went together. For instance, in the Government testing station at Pittsburg, those in charge had invited the manufacturers of explosives to send in samples of their products which would be tested, secretly, under their own eyes, without fuss or feathers. If the explosive survived the Government test, the name of the manufacturer would be published; that is, the name would be printed in the circulars distributed by the testing station. If the product did not come up to the standard, nothing would be said about it, the name of the manufacturer would not

be printed, but he would be requested to withdraw the product from sale, or to bring it up to the standard of safety. The same course was pursued in regard to electrical appliances used in the mines. These, too, were tested under similar conditions.

Doctor Holmes also said that a report had obtained circulation among mine inspectors that the Federal Government was about to undertake the inspection of mines. There was not a word of truth in this. The Government had no such intention. The only object of the Government in establishing the testing station was to aid the State mining inspectors in every way it could. Doctor Holmes, in conclusion, deprecated the present cut-throat competition among operators, and thought that the conditions at the mines would never be improved as they should be until the mineowners charged an adequate price for the coal at the mouth of the mine, as they do in England, where the operators receive \$1.60 per ton, on an average, instead of 60c. paid here.

A New Potash Salt

Although it has long been admitted that the red color of carnallite is due to iron oxide from the decomposition of some earlier ferruginous potash salt, it is only quite recently that a salt of this kind has been discovered. This discovery was made by Mr. Boeke in the mines of the Nordhäuser Kaliwerke, at a depth of 547 m., where the hard salt rests on the carnallite, in association with sylvine. The new salt, according to *Vulkan*, April 21, 1909, is of a pale pink or violet color in the bed, but turns yellow within a very few minutes after removal. It is very hard, with splintery fracture, the splinters being hard enough to wound the finger; it exhibits a characteristic inky taste. On exposure to the air it crumbles down to a sandy powder, the presence of which in the salt has led to shipments being rejected as "adulterated with sand," although the "sand" contains 50 per cent. of potassium chloride. In composition it consists of one part ferrous chloride, three parts potassium chloride, and one part sodium chloride, chemically combined, and is anhydrous. It has been named rinneite, after Professor Rinne, formerly of the Hanover Technical High School.

The 1908 production of alum and aluminum sulphate decreased from the figures for 1907. As shown by statistics of the U. S. Geological Survey, the output for the respective years was: 1907, alum, 10,404 short tons, valued at \$34.78 per ton; aluminum sulphate, 106,821 short tons, valued at \$18.80 per ton; 1908, alum, 7700 short tons at \$30.74 per ton and aluminum sulphate 97,255 short tons at \$18.87 per ton.

Time Recorder for Furnace Operations

By O. E. JAGER*

For the successful running of reverberatory furnaces it is sometimes necessary to keep track of the times of charging, tapping and skimming. If this is left to the furnaceman's memory it is liable to be reported wrongly or forgotten altogether. To overcome this difficulty I have devised the following arrangement of a Bristol recording gage:

Take any Bristol recording gage (the kind is immaterial as it becomes merely a

been done in the tinshop, the words, "skim," "tap" and "charge" are painted above their respective slots. In the accompanying illustration the marks nearest the center of the chart represent skimming, those in the middle, tapping, and the outside mark, the time of charging. The duration of the operations is not recorded.

Fit the tinplate over the chart in the place of the glass, and the apparatus is complete. The scriber can be made of a hardwood-pen handle tapered down to a long fine point. Use a No. 350 Bristol patent-smoked chart, which can be "fixed," after using, by immersion in a very weak solution of shellac in wood alcohol, thus

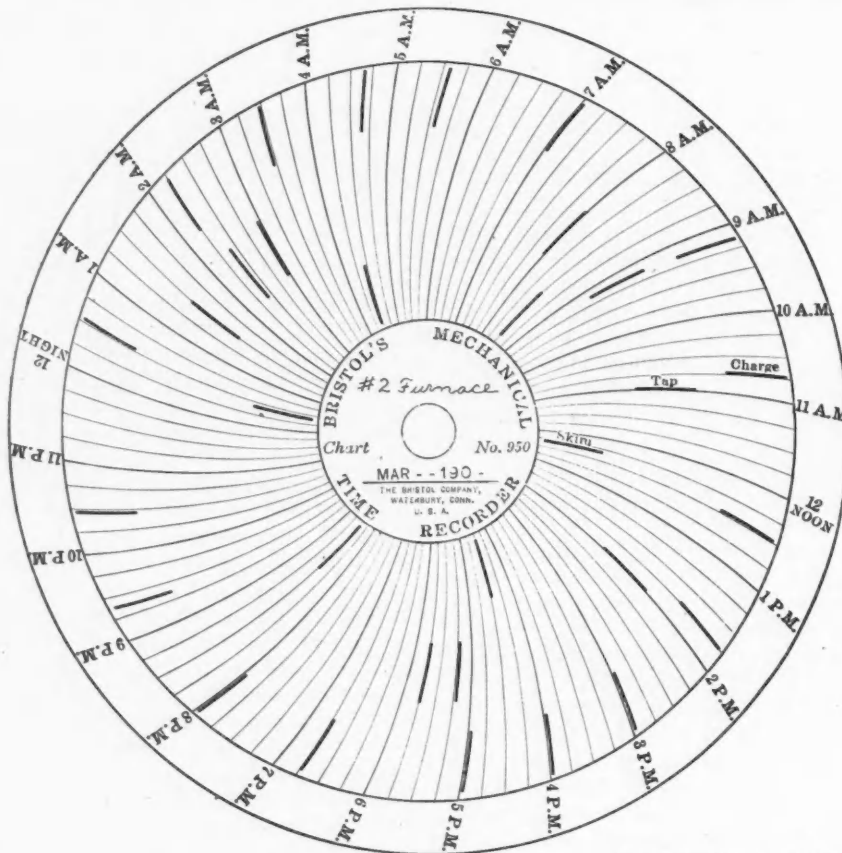
South African Diamond Mines

SPECIAL CORRESPONDENCE

At the recent annual meeting of the Premier Diamond Mining Company, managing director, Ross Frames, delivered a vigorous, fighting speech which thoroughly upheld the "traditions" of this young concern. The boldness of his views and the bitterness of his criticism of the De Beer's policy would have made more satisfactory reading to shareholders and public if the point of the question calling for solution were only the relation between the Premier's actual or prospective production and that of De Beers; for the managing director made out a good case for the Transvaal mine's claim to contribute a high proportion of the total yield. But the relation between its production and the market demand was discussed with less assurance and detail. The tone adopted in regard to this important point was one of unexpected confidence. Mr. Frames could not, of course, deny the reality of the market's collapse, but he contended that it had been greatly exaggerated.

The speeches of W. F. Frames and of Mr. Cullinan (chairman) were largely composed of criticisms in reply to the recent pronouncements of the chairman of De Beers. Apart from the points of debate, a great deal of valuable information was given as to mining conditions and results. The opinion was expressed with conviction that the Premier mine has now reached its "permanent" grade—that the present yield of about 25 to 26 carats per 100 loads (of 16 cub. ft. each) will probably see small variations in the future. Extensive tests of blue ground have shown average contents of 26 carats. It is reported that a layer of comparatively soft blue ground has been proved below the present workings, and that 45,000,000 loads of this material can be considered to be "in sight." It is well known that the Premier turns out a large quantity of inferior diamonds. Mr. Cullinan gave some interesting figures in evidence of this fact by stating that 33 per cent. in weight of the output represented 70 per cent. of the value. While the yield per 100 loads has been steadily decreasing to the present figure of 25.5 carats, the increasing scale and efficiency of operations has enabled working costs to be reduced to nearly 36c. per load. In the first year of high yields, the cost per carat was \$1.72; later on, when the whole mine was worked and yields fell, it went up to \$3.22 per carat. Now the cost has again dropped to \$1.72 per carat.

The directors appear to have bound themselves resolutely to a policy of expansion, in spite of all dangers of overproduction. The Premier produced 2,078,825 carats of diamonds last year. When the new No. 4 gear is completed, the



The Engineering & Mining Journal, N.Y.

RECORDING REVERBERATORY-FURNACE OPERATIONS AT THE STEPTOE SMELTER

time recorder in this instance), remove the front glass and turn the pen away to one side. Take a sheet of stout tinplate and cut it to the same size as the glass (8 5/16 in. in diameter for a gage taking 8-in. charts). Mark three slots, as shown on the record, on the same radius as the time lines on the chart. As the glass sets away from the chart about 3/4 in., the slots must be made with all sides sloping inward toward the chart, leaving about 1/16 in. clearance between the tin and the chart, so as to insure the correct marking of time by the scriber. This job having

constituting a record of operations for the day ready for filing.

The gage is put up in any convenient place near the furnace, and the scriber hung to it by a piece of string. Set the chart with the correct time directly under the slot. After skimming, tapping or charging, the furnaceman simply takes the scriber and marks in the corresponding slot. The fact of the gage being there is a reminder to him to do this. At the end of each shift the foreman opens the gage and copies off the times of the respective operations on his report. The chart can be easily modified to suit other operations.

*Nev. 11, Nev.

company will be treating 50,000 loads per day or, say, 16,000,000 loads per year. This, at 25 carats per 100 loads, is equivalent to 4,000,000 carats per annum. As announced by Mr. Cullinan, 67 per cent. of the yield by weight represents only 30 per cent. of the value. He further declared that only 12½ per cent. of the output in money value (presumably 30 or 40 per cent. by weight) need be regarded as in the least difficult of sale, when larger quantities are produced than at present.

The chairman gave some interesting statistics regarding the records of the Premier from the commencement of operations in 1902. Excluding the Cullinan diamond, the yield to date is valued at £6,500,000, of which £3,700,000 represents profit. On equipment £1,413,666 has been spent, £1,009,076 has been paid to the Government in profit tax and £880,000 distributed in dividends.

Useful Formulas

By F. CLOSE*

In the course of my experience, I have encountered or worked out, for my own convenience, various useful formulas calculated to save time, and have embodied the most useful of them in this paper in the hope that it will be added to from the experience of others. Most metallurgists and engineers have their own particular methods of working out problems which occur constantly in chemistry, surveying, etc., and a collection of the experiences thus gained should prove valuable.

One of the most useful formulas is that for the calculation of extractions.

Let assay of original = Oa .
 Weight of original = Ow .
 Assay of tailings = Ta .
 Weight of tailings = Tw .
 Assay of concentrates = Ca .
 Weight of concentrates = Cw .

Then the percentage extraction may be calculated from the weight and assay of concentrates; thus "concentrates products accounted for" or

$$\text{recovery} = \frac{Ca \times Cw}{Oa \times Ow} \times 100.$$

Similarly, "tailings products accounted for" or

$$\text{loss} = \frac{Ta \times Tw}{Oa \times Ow} \times 100.$$

Obviously the "extraction calculated from tailings" is 100 minus the above result. Examples of calculation of recovery by these formulas follow.

Let.

$Oa = 15$ per cent. Zn and 12 oz. Ag per ton.
 $Ow = 120$ ton.

$Ta = 7.5$ per cent. Zn and 3 oz. Ag per ton.

$Tw = 96$ tons.

$Ca = 45$ per cent. Zn and 48 oz. Ag per ton.

$Cw = 24$ tons.

Extraction of zinc calculated from weight and assay of concentrates would be

$$\frac{45 \times 24}{15 \times 120} \times 100 = 60$$

per cent. recovery.

Extraction of silver calculated from weight and assay of concentrates is

$$\frac{24 \times 48}{120 \times 12} \times 100 = 80$$

per cent. recovery.

Zinc tailings products accounted for:

$$\frac{7.5 \times 96}{15 \times 120} \times 100 = 40$$

per cent.

The extraction calculated from tailings is 100—40, or 60 per cent. recovered in concentrates, by difference.

The silver tailings products accounted for are:

$$\frac{3 \times 96}{12 \times 120} \times 100 = 20$$

per cent.

The extraction calculated from tailings is 100—20, or 80 per cent. recovery in concentrates.

A formula may now easily be derived for the calculation of extractions when only the assays of the products are known, the weights being unknown. The weight of the concentrates in terms of percentage by weight of the original may be expressed thus:

Percentage weight of concentrates =

$$\frac{Oa - Ta}{Ca - Ta} \times 100.$$

$$\text{Extraction} = \frac{Ca}{Oa} \times$$

percentage weight of concentrates.

Combining these last two formulas, the full formula for calculating the extraction is

$$\frac{Ca}{Oa} \times \frac{Oa - Ta}{Ca - Ta} \times 100.$$

Working out the above example from this formula, we have for the zinc extraction

$$\frac{45}{15} \times \frac{15 - 7.5}{45 - 7.5} \times 100 = 60$$

per cent.

The silver recovery would be

$$\frac{48}{12} \times \frac{12 - 3}{48 - 3} \times 100 = 80$$

per cent.

The method of arriving at the final

formula may be readily reviewed at any time by examining the formulas which have been combined to obtain the extraction formula. It will be noted that the extraction thus calculated without the weights works out the same as the extraction calculated from weight and assay, namely 60 per cent. for Zn, and 80 per cent. for Ag. Owing to errors in sampling or assaying, the extractions and weights worked out by formula will seldom check as closely in actual practice as in the above examples. A combination of errors may be either cumulative or neutralizing in effect. It should be noted that a + error, causing a + deviation from the correct result calculated by weight and assay, causes a — deviation calculated from the formula using assays only, and vice versa. This is apparently contradictory, but in the case of a + error in tails, calculated from weight and assay, the error must be added to the "tailings products accounted for," and the result subtracted from 100 to get the "extraction calculated from tailings," thus lowering the extraction. When calculating by the assay formula the same + error in tails assay will cause a — deviation from the correct result and this — quantity must be subtracted to get the correct extraction.

The following formulas for the rapid calculation of the quantity of water contained in pipes may be found useful:

$$\frac{(\text{Diameter in inches})^2}{5} =$$

Imp. gallons in 6 ft. of pipe, or

$$(\text{Diameter in inches})^2 \times 2 =$$

pounds of water in 6 ft. of pipe.

As an example, suppose one desires to know roughly how much water is contained in a 6-in. pipe, 12 ft. long.

$$\frac{36}{5} \times 2 = 14.4$$

Imp. gallons, or

$$36 \times 2 \times 2 = 144$$

pounds.

This is an approximation only, the correct figure being 147 lb. The 2 per cent. error can, however, in most cases, be neglected. Given the diameter of the plunger and the stroke, the amount of water delivered by a plunger pump per stroke can be quickly calculated from this formula.

The annual report of the German ammonia trust (*Chem. Trade Journ.*, April 17, 1909) gives the European and American production of sulphate of ammonia as follows: Great Britain, about 314,000 tons; Germany, 313,000; United States, 82,000; France, 54,000; Belgium and Holland, 35,000; Austria, Spain and other countries, 80,000 tons.

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Pensions for Iron Miners

The Cleveland Cliffs Iron Company, of Michigan, has established a system for pensioning its employees who have been disabled by accident or through age and long service. Besides allowing pensions for retired employes, the widows and orphans of workmen killed while discharging their duty are also to be benefited. One provision is that the widow and children of the workman meeting death must be residents of the United States at the time of the fatality. If a man accidentally killed while at work for the company leaves a widow without children, or a widow with children under the age of 16 years who are dependent upon their own efforts for support, or if he leaves children under the age of 16 who are without other means of support, but leaves no widow, the company will contribute \$12 per month to her or their support for a period of five years. If the widow should marry or become self supporting within that time the pension will cease. For each child under 16 years of age left with a widowed mother, \$1 per month in addition to the \$12 allowed her will be paid for a period of five years. If there is no widow the children under 16 years of age will receive their allowance through an administrator. In the event that all children of employees meeting death at the company's properties are under 10 years of age the pension board will have the power to extend payments beyond the five-year period.

Under the rules to govern the payment of pensions no assignments of money due widows or orphans will be accepted, nor will the company recognize such assignments in any way. No money due, or about to become due, a pensioner will be liable to attachment, levy or seizure by or under any legal process whatever, whether the same remains with the company or an agent thereof. Should a creditor attempt to collect moneys due a pensioner, such pension allowance shall be forfeited to the company and shall belong to it absolutely, to be dealt with as the pension board shall deem proper.

All pension allowances will be paid monthly during the life of the beneficiary, but the company may withhold its stipend in case of gross misconduct.

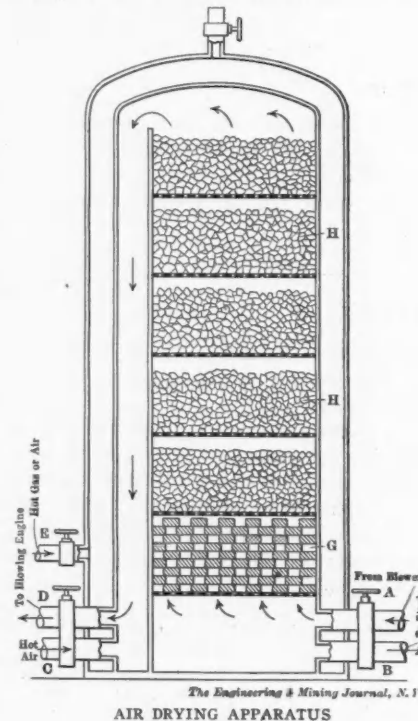
All employees who have attained the age of 70 years and have been, in the service of the company for 20 years or more, the last 10 of which shall have been continuous, shall be retired and pensioned.

Any employee who has attained the age of 60 to 69, and who has been in the service of the company 25 years or more, the last 10 of which shall have been continuous, may at his own request be retired from active service and become eligible to a pension.

The monthly allowance paid each person shall be on the following basis:

For each year of service 1 per cent. of the average monthly pay for the 10 years next preceding retirement, provided that the annual pension disbursements for all persons shall not exceed the amount available from the pension fund, set aside by the pension board.

Should the aggregate pension allowance for two successive years exceed the amount added for those two years to the pension fund through apportionment and interest, in the absence of action by the board of directors a new rate shall be established by the pension board proportionally reducing all allowances. Notice of change of rate shall be given employees who are on the pension roll before the beginning of the fiscal year in which the change shall become effective.



The amount of pensions will depend, as above stated, upon two conditions: the number of years an employee has served the company, and the amount of his average wages per month, for the 10 years preceding retirement. If the average earnings, as above, should exceed \$100 per month, the pension payment will be based on \$10, this being the maximum wage on which pension allowance will be computed; but no pension shall be less than \$15 per month.

The pension board will be composed of W. G. Mather, M. M. Duncan, Austin Farrell, C. V. R. Townsend, W. P. Bellden and W. H. Moulton. Mr. Mather is president and Mr Moulton is the board's secretary.

In 1908 the United States produced 15 tons of molybdenum ore worth approximately \$6000 according to statistics of THE MINERAL INDUSTRY.

Drying Air for Blast Furnaces

F. W. Harbord describes (British Pat. 4424 of 1908) an apparatus for removing moisture from the air before it enters blast furnaces used for the manufacture of iron. In his specification 25,112 of 1906 various materials, as salts in connection with absorbing agents such as coke, kieselguhr, etc., were suggested and in his later specification, dried peat. With the latter the use of two or more chambers alternately was proposed, but now the hydrated material is not only first dried, but it is also cooled prior to being hydrated again.

In the accompanying illustration is shown a sectional elevation of a chamber in which are bricks of peat *G* and lumps *H*, all of which have been saturated with calcium and ferric chloride and afterward dried. The valves *B*, *C* and *E* being closed the air from the subsidiary blower enters *A*, and passes through the dehydrating chamber, the dry air leaving the chamber through the valve *D*.

When the dehydrating material is so saturated with moisture that it fails to work effectively, valves *A* and *D* are closed while valves *B* and *C* are opened and hot air at about 210 deg. C., is drawn or forced through the material to dry it, and through valve *E* hot air or gas enters the surrounding jacket. Meantime the moist air from the blower passes through the second cooled chamber, and then through the third chamber in which the material has just been dried and which it is desired to cool.

Mercury in Italy

According to a report by Mr. Nicou, the columnar deposits of cinnabar in the Monte Amiata district contain 1 per cent. mineral (60 per cent. mercury) (*La Metallurgie*, April 21, 1909). The ore is screened, and all the small fragments less than 1½ in. are roasted in Cermak furnaces. The chief mine is that of Abbadia San Salvatore, which turns out about 25,000 tons of 1-per cent. ore yearly. Altogether, the number of furnaces running is 28, among which are seven Cermak furnaces with a capacity of 24 to 30 tons, four of 12 to 15 tons' capacity, four of 2 to 8 tons' capacity, and 13 ordinary 6-ton furnaces. The average recovery from a large furnace is 95.2 per cent. of the total mercury contained in the ore. The latter costs 13s. 6d. to 22s. 6d. per ton at the mine, and the cost of classification, conveyance, and treatment is 3s. 3d. per ton, making the total cost 16s. 9d. to 25s. 9d. for the 12¾ lb. of mercury recovered, or 1s. 4d. to 2s. per lb. Although the quality of the ore is diminishing, the use of improved appliances enables the output of mercury to be maintained, and even increased, so that Italy contributes nearly 400 tons out of a total of about 3600 tons produced throughout the world.

Crucible Assays

By A. A. STEEL*

When first teaching a class in assaying, I was impressed by the vague and unscientific discussions of crucible charges as given in all the older text books. Most of these simply give tables of charges for various pure gangues, and it is difficult from these to flux mixtures of minerals. A method of figuring crucible charges was therefore worked out so as to eliminate all uncertainties except the exact percentage composition of the gangue.

Professor Fulton's recent book¹ has a good discussion of the nature of assay slags but it gives no simple method of figuring charges. It may be of interest therefore to present the following directions for crucible assaying, which are given to the students of the University of Arkansas after they have figured a few slags by metallurgical methods:

DIRECTIONS FOR FLUXING CHARGES

(1) Examine the material submitted for assay and estimate its approximate mineralogical composition. Then write down the corresponding weight of each mineral in the quantity to be melted (usually 0.5 A.T., called 15 grams.)

(2) *Silica*. Add, if necessary, enough silica to make with that already present in the ore 2 grams of SiO_2 for each gram of CaCO_3 , MgCO_3 or BaSO_4 (calcite, dolomite or barite) present, and $1\frac{1}{2}$ grams for each gram of Fe_2O_3 , ZnO , clay or other infusible silicate (hematite, zinc mineral, kaolin, etc. Limonite is equivalent to $\frac{2}{3}$ its weight Fe_2O_3 and pyrite to $\frac{3}{4}$.) Consider $1\frac{1}{4}$ grams of powdered glass equivalent to one gram of silica.

(3) *Borax*. Add $\frac{1}{3}$ of a gram of borax glass for each gram of silica or infusible silicate (clay or talc) present in the ore and the fluxes. For cupel assays add four grams of borax for each gram of bone ash.

(4) *Soda*. Add $1\frac{1}{3}$ grams of sodium bicarbonate for each gram of SiO_2 present in the ore or fluxes. Consider fusible silicates as glass, etc., equivalent to 50 per cent. silica. For pure lead ores add at least $\frac{2}{3}$ the weight of the ore. For clay, talc, etc., use a mixture of soda and potash.

(5) *Litharge*. Add enough litharge (0—20 grams) to make with the lead already in the ore an 18-gram button and in addition for the slag, 2 grams of PbO for each gram of silica or infusible silicate in the ore. (Consider glass as equivalent to 50 per cent. silica). For cupels add 2 grams of PbO for each gram of bone ash. Increase the amount of PbO largely to keep copper, zinc, antimony, arsenic,

and tellurium out of the button if they are present in the ore. For ease in correction for silver in the PbO use litharge in even multiples of 10 grams only.

(6) *Argol or niter*. Add enough argol or niter to make an 18-gram button. One gram of Fe_2O_3 may be assumed to prevent the reduction of about $1\frac{1}{2}$ grams of lead, but the reducing power of sulphides should be determined by a preliminary assay if they are present. When more niter than the weight of the ore is required do not use this method. Roast ores containing much pyrite, antimony or arsenic adding charcoal for antimony and arsenic. If but little niter is required use the niter method in preference to roasting. For galena, etc., nails may be used with charges in which the PbO for the slag is replaced by NaHCO_3 in excess. When niter is added in the nail method, be careful to form no FeO which will not fuse in the soda slag.

(7) Buttons brittle from antimony or zinc or showing scales of copper must be scorified.

This system of fluxing forms a bisilicate of Na_2O and PbO or $\text{Na}_2\text{Pb}(\text{SiO}_3)_2$. This is ample flux for a pure quartz gangue and in it the other bases dissolve forming, of course, slags of lower silicate degree. As given, the charge for pure limestone yields a slag of oxygen ratio of 1 in the base to 1.54 in the acid **not counting borax**. BaSO_4 gives a ratio of 1 to 1.7; MgCO_3 , 1 to 1.47; Fe_2O_3 (as FeO), 1 to 1.33; clay, 1 to 1.42; etc.

EFFECT OF THE BORAX

Since borax is added to form a borosilicate it is reasonable to figure it according to the amount of SiO_2 present in the slag. The proportion given has not been finally settled upon as the best. It is sufficient to greatly lower the temperature of slag formation, to make the slag viscous during the reduction period, and to lower the temperature of final complete fluidity. It is also sufficient to serve as a general safeguard to flux a slight excess of either acid or base. On the other hand it is expensive and makes the buttons more difficult to clean.

Our charges are a little higher in PbO than usual and for some basic ores it will be more economical to substitute soda for litharge but this makes the charge more bulky. For ease in remembering it was thought better to have a constant ratio of soda and litharge to silica rather than to use the form 1 to $1\frac{1}{2}$ grams of soda and 1.5 to 2 grams of PbO for each gram of silica, which is more nearly what would be used by an experienced assayer.

The amount of fluxes as given by this table are ample and without any great excess. In estimating weights to be fluxed even grams are taken, using care to see that the weight of refractory mineral is over-estimated rather than under-estimated. The minimum amount of the sodium lead silicate required to dissolve

the various bases has not yet been accurately determined. If I ever conduct a class in assaying again, this will be worked out for the more common minerals by making up charges of the pure oxides, etc. It is also desired to work out the amount of excess litharge needed for each gram of copper, antimony, etc., in the charge to make clean buttons. This PbO method has been found to work well with up to 25 per cent. of antimony and 60 per cent. of zinc as sulphides but is not so successful for copper.

DISSOLVING ACTION OF LITHARGE

A large excess of PbO severely attacks the crucibles and the risk of ruining the muffle by spilled charges becomes important. Therefore it is thought best to scorify the coppery buttons as is done with the buttons obtained in the standard scorification method for copper mattes.

On account of this dissolving action of litharge upon the crucibles more litharge, as given in the directions, is of advantage in assaying clay and talc ores. The charges without excess litharge have very little effect upon Denver crucibles and attack the Battersea crucibles but slightly. The borax seems to protect the crucibles from being drilled by PbO probably by coating them with a viscous aluminum borosilicate.

We have found that by long fusion cupels can be entirely dissolved to a fairly fluid slag by much borax with some PbO and no soda or silica. This forms calcium borate and sodium phosphate as in the tests on platinum wire. The amount of bone ash in the charge is determined by weighing the cupel with the litharge and subtracting the standard weight of that size cupel when new, to give the PbO to be deducted from the weight of the stained part of the cupel. Apology is asked for the incomplete state of these data, but I thought it better to publish this now, rather than postpone it indefinitely in awaiting complete data.

Probably the best time ever made in loading iron ore in the Lake Superior region was made by the "W. E. Corey," a Steel Corporation boat, at Ashland, Wis., on June 8. The vessel sailed with 10,234 tons of iron ore on board in 83 minutes from the time she tied up at the dock light. The actual loading time was 63 minutes, making an average of 159 tons per minute.

Discoveries of copper, gold and silver are reported to have been made on the Fiji islands, and western Australian mining men are at Suva, Viti Levu, awaiting the gazettal by the local government of regulations under which mining may be carried on, after which the new finds will be thoroughly exploited. No mining on a commercial scale has ever been done on these islands.

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¹"A Manual of Fire Assaying," Hill Publishing Company, New York, 1907.

Colliery Notes

The Ruhr coalfield in Germany is the largest and most important coalfield in that country. It covers an area of approximately 1080 sq.m. The estimated amount of available coal in Germany is 140,000,000,000 tons.

An average sample of Pictou (Nova Scotia) coal shows the following composition: Fixed carbon, 61.95; volatile matter, 25.87; moisture, 1.75; ash, 10.42. From this variety of coal 8000 cu.ft. of 15 c.-p. gas can be produced.

Many mining engineers are advising against the use of electrical coal cutters at the faces of gaseous workings. They claim it is better to install compressors in places where electricity may be taken with comparative safety, and then work the cutters with compressed air.

Accidents in coal mines often result from unexpected causes. One such case recently occurred in an English mine where a stone fell from the roof and an armored cable was cut. The mine was gaseous and a spark from the cut cable fired the explosive mixture with fatal results.

England and the United States are the only two countries that produce such quantities of good fuel for all purposes as to render the importation of any further supply unnecessary. Germany, France, Belgium and Austria raise enormous quantities of fuel, but the coal measures of these latter countries are deficient in some varieties that are required for specific purposes.

It is usually true, except where conditions are modified by the percolation of water, that the quantity of firedamp given off in a mine, as well as the temperature and dryness of the underground workings, increases proportionately with depth. It will generally be found that workings at a depth of from 500 to 700 ft. are damp in hot weather and dry in cold weather. Workings at a greater depth than 700 ft. are nearly always dry, and the deeper the drier.

When considering an electrical underground installation, the mine manager or superintendent should remember that although the danger of shock is a matter to be carefully considered, the greater problem should be to try and eliminate the dangers from fire and explosions of gas that may result from the use of electricity. One serious explosion is likely to cause a greater loss of life than would result from electric shocks during the period of a year.

Professor Galloway recently stated as his belief that the damping of the dust for a certain distance in front of blasting shots about to be fired should be compulsory. He does not approve of shirking this precaution on the plea that permitted

explosives are used. He regards it as obvious that if the deposition of coal dust in the roadways of mines could be altogether prevented, or failing that, if after being deposited it could be rendered innocuous, great explosions would become impossible.

In preventing the deposition of coal dust in the roadways of mines, Professor Galloway says that the only means of effecting this result is to make use of dust-tight mine cars, filled to the level of their upper edges with coal; then to convey these cars along the roadway at such a speed that the shaking to which their contents are subjected during transit, is insufficient to cause dust to arise from them; and to carefully gather up and remove all traces of coal from the floor when a car happens to be accidentally overturned.

It is difficult to estimate proportionately the classes of work to which coal is put, therefore the following figures of an English statistician are most interesting. This writer extended his research over a period of years and gives the percentages of the main applications of coal in the United Kingdom as follows: Railways, 8.19; coasting steamers, 4.81; collieries, 7.22; factories, 24.07; blast furnaces, 11.44; steel and malleable iron works, 7.85; other metallurgical works, 1.20; chemical works, potteries, glass works, 3.61; gas works, 9.63; domestic, 21.08.

It is still a debated question as to whether as good results in the blast furnace can be obtained with by-product as with beehive coke. After examining this problem, Charles Bell stated that with the same ore, the consumption of coke per ton of pig iron showed a saving of 2.20 cwt. in favor of the by-product article. Opinion is still divided, however, as to the relative merits of the two cokes for smelting purposes. With the improved type of modern by-product ovens the superiority, if any, of the beehive cokes is very slight, and is not sufficient to justify the wastage incidental to coking in the beehive oven.

Dry powdered calcium chloride, similar to the product used for damping dust in coal mines, is a rather expensive article, costing about \$12 a ton. As compared with the cost of sprinkling with plain water, the use of the powder shows a saving in labor, and does not require any capital outlay for pipes, barrels, hoses, sprinklers, etc. One mine manager estimates that the cost of sprinkling an entry, 9 ft. wide and 300 ft. long, with powdered calcium chloride, would average about \$3.12; the water would have to be applied daily, whereas the calcium chloride would apparently be effective for three months.

Professor Meyer, of Germany, who conducted a number of experiments to determine the nature and quantity of the gases occluded in various coals, placed pieces of coal of the size of a

nut in a flask and boiled them in water which had previously been made air-free by boiling; the flask was provided with an india-rubber stopper, through which a glass tube led the escaping gases. The latter were collected over boiling water. Professor Meyer obtained from British and Westphalian samples, heated to 100 deg. C., from 4 to 238 c.c. of gas per 100 grams of coal. The gases varied in composition, but all contained carburetted hydrogen, carbon dioxide, oxygen and nitrogen.

A large metal safety barrier was recently built for the Heinitz colliery, Upper Silesia. The barrier is constructed in three sections, and is designed to stand a pressure of 750 lb., and is provided with three doors; two of these doors measure 6 ft. in height by 3½ ft. wide, and are used for the passage of the cars in the haulage road; the middle door is for foot passengers, being 6 ft. high and 31 in. wide. The total weight of the barrier is 35 tons. The metal used in making the casting consisted of pig iron with an addition of steel, the resulting material being stronger and tougher than gray cast iron, and midway between the latter and cast steel in point of tensile strength, while cheaper than cast steel.

The total exposed area of the seven important coalfields of England and Wales, is 2786 sq.m. There are in the various fields 190 seams of coal of more than 2 ft. in thickness at a less depth than 4000 ft. These beds represent a total thickness of 666 ft., an average of about 3 ft. 6 in. per seam. According to a recent report by the Royal Coal Commission, the amount of fuel still available in the above areas, excluding all seams of less than 2 ft. in thickness and more than 4000 ft. deep, is 79,000,000,000 tons. The thinner and deeper seams are estimated to contain an additional 70,000,000,000 tons. According to this estimate, and basing calculations on the present annual rate of extraction, the combined coal resources of Great Britain should last about 600 years.

China is rich in coal, which is widely distributed throughout the vast empire. The coal measures are of an age more recent than the Carboniferous, probably Jurassic. There are probably larger deposits of anthracite in China than in any other country. The Shan-si coalfield covers an area of 55,000 sq.m.; one bituminous seam in this field is 20-ft. thick. In Hu-nan, anthracite coal, having a conchoidal fracture and comparable with the best known varieties is found. The strata in this district are greatly broken up, and the inclinations are often great. The total area of the coal measures in this district is estimated at 21,000 sq.m. An average sample of Manchurian coal gives the following analysis: Fixed carbon, 62; volatile matter, 26; ash, 10; moisture, 2; sulphur, traces.

THE ENGINEERING AND MINING JOURNAL

Issued Weekly by the
Hill Publishing Company

JOHN A. HILL, Pres. and Treas. ROBERT MCKEAN, Sec'y.
506 Pearl St., New York.
London Office: 6 Bouverie Street, London, E. C., Eng.
CABLE ADDRESS "ENGINIJOUR, N. Y."

Subscription, payable in advance, \$5.00 a year of 52 numbers, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines. \$6.50 in Canada.

To foreign Countries, including postage, \$8.00 or its equivalent, 33 shillings; 33 marks; or 40 francs.

Notice to discontinue should be written to the New York office in every instance.

Advertising copy should reach New York office by Thursday, a week before date of issue.

For sale by all newsdealers generally.

Entered at New York Post Office as mail matter of the second class.

CIRCULATION STATEMENT

During 1908 we printed and circulated 507,500 copies of THE ENGINEERING AND MINING JOURNAL.

Our circulation for May, 1909, was 52,000 copies.

June 5.....	11,000
June 12.....	9,500
June 19.....	9,500

None sent free regularly, no back numbers. Figures are live, net circulation.

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The Copper Statistics for May

The report of the Copper Producers' Association for May was received generally in an optimistic way, but analysis of the figures does not seem to us to afford any substantial basis for joy. The accumulated stock was reduced by about 13,500,000 lb., but it does not by any means follow from this that the production of copper is now being used up faster than it is being turned out. On the contrary, the reduction of the accumulation in the hands of the refiners implies chiefly a transferal of the metal from one place to another. The exports in May were upward of 70,000,000 lb., a high figure. What was happening is reflected by the European statistics for May, which showed an increase of about 12,200,000 lb. in the visible supply.

Deducting the exports from the deliveries, there remains upward of 60,000,000 lb. that must have gone into second hands on this side, or was to some extent on lighters awaiting export. It is, of course, utterly incredible that domestic consumption has yet reached the figure of 60,000,000 lb. per month, which would be higher than the best on record. Undoubtedly some large manufacturers took a great deal of copper into their yards during May, providing for requirements for some time ahead. This is another way of transferring stocks.

The ominous feature about the statistics for May is the continued increase in the production, which averaged 3,818,000 lb. per day, against 3,785,810 lb. in April. The ratio of increase was larger in May than it was in April. It is well known that some large consumers of copper have taken in their requirements for many months ahead. The actual consumption of the world will have to make further strides in order to take care of the steadily increasing production and bring about a real diminution of stocks.

The real condition of affairs is reflected in the weakness of the market this week. Consumers have been well supplied and producers have much copper yet to sell. The visible supply at the middle of June, as cabled from abroad, shows a large increase, and the statistics at the end of the month will doubtless show a further augmentation.

The World's Production of Gold and Silver

According to our latest compilation of the official statistics so far as reported, with estimates for the minor countries from which official reports have not yet been received, the production of gold in the world in 1908 was 444,382,312, compared to \$411,294,458. The production in 1908 not only was the largest on record but also it showed a larger increase compared with the previous year than for any time since 1898. Large increases in the production were shown by the United States, Canada, Mexico, Russia, Rhodesia and the Transvaal. The production of British India was about the same as in 1907. The only important gold-producing country to show a decrease was Australasia.

In spite of the lower price for silver there was an important increase in the production of that metal, which amounted to 200,655,383 oz. in 1908, against 183,386,250 oz. in 1907. There was a large decrease in the production of the United States and a small decrease in that of Australasia, but there were very large increases in the production of Mexico and Canada and small increases in several of the South American countries. The decreases in the United States and Australasia are explained by the reduced outputs of some of the base-metal mines which yield silver as a by-product of copper and lead. The large increases in Mexico and Canada are explained by the extension of the application of the cyanide process to the treatment of silver ore in the former country, and to the larger production of the remarkable Cobalt district in the latter country.

Santa Rita and Chino

A lady saint and a Chinaman, whereby hangs a tale. Some time ago our friend, Thomas W. Lawson, favored us with a handsomely engraved communication to the effect that he would soon present to us, together with other selected persons, an important literary production. In due course of time, the latter appeared and turned out to be a book dealing with a new process and the Santa Rita mine, to which we have previously referred. In the natural order of events, the materialization of this publication should have been followed by a loud blowing of the

bazoo. Strange to say there was silence, and stranger still, the Santa Rita mine was brought out a few days later, under the name of the Chino Copper Company, by a well known house of bankers and brokers, without one mention of Mr. Lawson. Our readers are interested in having an explanation of this sudden shift.

Mr. Lawson intended to promote the Santa Rita company. He owned an interest in it and had options upon the other interests. He published his book before he had exercised his options. Just then certain unexpected events occurred that led Mr. Lawson to refrain from exercising his options and transfer them to the house that brought out the Chino Copper Company.

The Santa Rita mine has a large deposit of oxidized ore of very low grade, below which there is low-grade, disseminated sulphide ore, that has not yet been extensively developed. Mr. Lawson contemplated treating the oxidized ore by a new hydrometallurgical process. The new owners are directing their attention to the sulphide ore in the conventional way.

The Wage Question at Broken Hill

As has been heretofore noted in the JOURNAL, the miners at most of the large silver-lead mines in the Broken Hill district of New South Wales have been on strike for some time past, and there is no immediate prospect of a settlement. The strike and the subsequent proceedings present some peculiarities, which are of interest. Some of these are due to the Australian law of arbitration, which is generally considered to be favorable to the unions, whose political influence has been very strong.

To go back to the origin of the trouble, the Broken Hill Proprietary Company—the principal company in the field—which had been paying its men on a stipulated scale, settled by arbitration in 1903, agreed about the end of 1906 to make a general advance of about 12½ per cent. This advance was granted without any contest, in view of the high prices for lead and silver then prevailing, which made the increase possible. The example of the Proprietary Company was followed by the other companies in the field. The advanced rate was to hold for two years. At the close of that time, in August of

last year, the company decided to withdraw the advance, owing to the fall in the prices of metal. At the same time it offered the men, not simply a return to the wages of 1903, but a sliding scale, based on the price of lead, so that any advance in the metal would carry with it an increase in wages. This was not accepted by the men, who appealed to the Arbitration Court provided by Australian law, and who also decided to stop work, although the company offered to guarantee payment at the higher rate, if the Court should decide against it.

The action of the Broken Hill Proprietary Company was followed by the Broken Hill Block 10 Company, but after the men had struck the minor companies in the field generally gave way, and paid the higher schedule. When the case came before the Arbitration Court the two companies represented that a continuation of the 1906 schedule at present prices for lead and silver would force them to work without any profit, or at a loss, and that they would be compelled, under such circumstances, to close down altogether.

The Court, however, decided against the companies, not on the basis of their argument, but apparently entirely on the ground that the rate of 1906 represented the lowest point which could be regarded as a "living wage" in the district. It may be noted here that the rate for unskilled labor, under the award of 1903 was the same which had been paid for 10 years previously, and was 7s. 6d. (\$1.80) per day. The increase in 1906 brought it up to 8s. 7½d. (\$2.07) per day. This was the rate in controversy; miners in the district generally work on contract, and in 1908 averaged from \$2.76 to \$2.90 per day.

The Proprietary Company believed that the Arbitration Court had exceeded its powers in basing a decision, not upon the facts in the case, but upon its theory of the amount of a "living wage." Accordingly it appealed to the higher court. Some propositions for a compromise have been made, but not accepted. The latest reports state that the Appellate Court has approved the decision of the Arbitration Court, but solely on the ground that it had not exceeded its powers; the higher court not going at all into the merits of the case.

The Broken Hill laborers have accordingly gained a victory in one sense; but they do not seem likely to derive much benefit therefrom. The Proprietary Com-

pany has decided to continue work at its Port Pirie smelter to carry out certain contracts, but at the mines only to a limited extent. A large number of its former employees will be out of work altogether, as all of them have been for some months past.

Apparently the theory of the "living wage" is legally established in New South Wales; but in a way, probably not expected by the strikers, it will have a practical application to owners and employers as well as to employees. There is no legal way to compel owners to work their property at a loss. The price of such products as lead and silver depends on conditions beyond their control. If the men are unwilling to work except at a price which will make it impossible to produce the metals at some profit, the production must cease in time. A graduation of prices to wages would be possible only in the case of a producer who held an absolute monopoly.

The proper division of profits between owners and workmen is a complex question which, in all probability, will never be completely settled. The controversy at Broken Hill, apparently, has done little toward advancing that settlement.

The Broken Hill Proprietary mine of New South Wales is admittedly nearing the end of its life. At the last semi-annual meeting of the company, the chairman of the directors stated that at the end of August, 1908, the ore reserves amounted to 3,000,000 tons. During the following six months 264,847 tons of ore were raised, leaving 2,735,153 tons. No considerable orebodies have been encountered during the last year, and the immediate prospects are confessedly disappointing. At the present rate of production the life of the mine will be about five years more. If no new orebodies are discovered in the meanwhile, this will be the end of a glorious career.

THE MINERAL INDUSTRY, Vol. XVII, is now on the press and should be ready for distribution before the middle of July. It will be a volume of about 1100 pages. The printing is being done directly from the type, no plates being made, wherefore there will be no reprinting. The edition being thus limited, subscribers are advised to send in their orders early. There will be no complimentary list and no copies will be sent to the press for review.

The California Eight-hour Law The Psychology of a "Bull Market" Mineral Production of Virginia

BY THOMAS LEONARD WATSON*

The new eight-hour law for miners in underground mines and men in reduction works, is to be tested at once before the Supreme Court. Fred J. Martin, superintendent of the Utica Mining Company at Angeles in Calaveras county, was arrested for keeping a miner in the 663-ft. level of the mine for 8½ hours, which is a longer time than the new law permits. He was arrested and imprisoned, Judge McSorley, of the Superior Court, of Calaveras county holding that the law was constitutional. A petition for a writ of *habeas corpus* has now been filed in Mr. Martin's behalf, which brings the matter at once before the Supreme Court. The law is attacked on allegations that it is special legislation and that the title embraces more than one subject. The attorneys for Martin contend that the regulation of labor in "smelters and other institutions for the reduction or refining of ores or metals" can in no sense be germane to labor in "underground mines," so as to be included within the general scope of an act "to regulate the hours of labor in mines." It is contended that the title of the act is in conflict with the State constitution, which provides that every act shall embrace but one subject, which subject shall be expressed in its title. But if any subject shall be embraced in an act which shall not be expressed in its title, the act shall be void as to so much thereof as shall not be expressed in its title.

The expression of two incongruous and disconnected subjects in the title of the act can only have the effect of rendering the whole void for uncertainty. If the title had been left as it originally stood, only such parts as were not expressed in the title would have been void, but the title was amended, and this, the lawyers think, destroyed the entire act.

The title of the law as amended is "an act regulating the hours of employment in underground mines and in smelting and reduction works." It does not take in all kinds of mines, and is thus considered special legislation. Men can work, or be worked, in placers, hydraulic and river-bed mines and gold dredges for any length of time without restriction, but if they get the gold in underground mining they cannot work more than eight hours even if they wish; and if the superintendent permits them to do so he is subject to fine and imprisonment, as in the case of Mr. Martin, of the Utica. As predicted in one of these letters the matter has been brought to issue very promptly by the mineowners and operators of the State, who will jointly press the suit now commenced to test the constitutionality of the law. Frank J. Solinsky and Paul C. Morf, of San Francisco, both well known mining lawyers represent the California Miner's Association and Mr. Martin.

In America, a "bull market" in stocks is an event which supersedes all other considerations of the day, says *The Evening Post*. Up to a certain point in its history, popular comment on it is pretty much limited among people out of Wall Street, to remarks by business men and their clerks that "I see stocks are picking up," with the inference that "things ought to be better with us, after a while." The Stock Exchange is then regarded as an indicator which is watching general business and trying to get the correct gage of it. The rise goes on; one hears less about business conditions and more of the market itself as the primary consideration. Quiet readers of the afternoon paper at the club, men to whom Wall Street is a picturesque idea and nothing else, stroll up to the latest arrival from an office south of Pine street, to inquire, curiously, "What are you doing with things down there?" Inquiries from widows and orphans next begin to arrive, as to whether they had not better sell the bonds that were left to them in the will, and put the money into Tin preferred or Amalgamated Nickel. This is preliminary, if the ticker keeps at its duty, to those profound conferences on the ferryboats and around the lunch counters, over the "inside pointer," which John or Henry got from a first-rate source, and which means ten points on the narrowest figuring. If the episode goes still further, it sometimes supersedes not only horse racing, but the standing of baseball teams, as the nearest topic of common interest.

It is the business of our high financiers to encourage and promote this pleasant pastime, and the way of doing it has been fairly well marked out by experience. If there are "new deals" under way in the finances of companies whose shares are listed on the Stock Exchange, they must be announced at judicious intervals, according as stimulus is needed for the "bull movement" and each of them must be held back until the psychological moment—which, naturally, means until the stock has been accumulated by the people with "inside information," has been bid up to very much higher prices, and is ripe for transfer in exchange for the outside public's cash. This is what Wall Street calls "distribution"—a term which, since it remotely suggests benevolence, is more favored than the term, "unloading," whose associations are more harsh. The rest of the history of the episode depends on circumstances; it is these which provide the gambling element which, after all has been said, is as dear to high as to low finance.

According to THE MINERAL INDUSTRY, 1908 was the first year in which magnesium was produced in the United States. The output amounted to 500 lb. worth \$500.

The statistics of production and value of minerals in Virginia for 1908—not including metals—collected by the Virginia Geological Survey in cooperation with the Division of Mineral Resources of the U. S. Geological Survey, clearly indicates the effect of the recent business depression arising from the monetary troubles. The decrease is especially noticeable in the larger industries, such as coal and coke, clay products, iron ores, stone, talc and soapstone, etc., but some of the smaller ones, of which there are many, show a marked increase. The total value for the year 1908 is \$12,059,310, or about 70 per cent. of the production for 1907.

The quantities and values of the principal mineral products were:

	Quantities.	Values.
Coal.....	Sh. tons 4,224,821	\$3,881,448
Coke.....	" 1,158,517	2,093,474
Iron ore.....	Lg. tons 645,460	1,372,802
Pyrite and pyrrhotite.....	" 117,440	389,808
Manganese ore.....	" 6,144	62,779
Miscellaneous minerals.....	Sh. tons 27,404	114,572
Mica, sheet.....	Lb. 13,427	7,346
Mica, scrap.....	Sh. tons 46	
Talc and soapstone.....	" 18,623	335,068
Mineral waters.....	Gal. 2,316,619	434,742
Total.....		\$8,692,039
Add clay and stone.....		3,367,271
Total values.....		\$12,059,310

Miscellaneous minerals include barytes, gypsum, feldspar and mineral paint. The quantities and values of the building materials produced were as follows:

	Quantities.	Values.
Granite.....		\$321,530
Limestone.....	Lg. tons 442,094	272,306
Slate.....	Squares 41,678	194,356
Millstones and sandstone.....		8,554
Sand and gravel.....		226,782
Clay.....	Sh. tons 585	3,619
Brick and tile.....	M. 196,054	1,525,191
Sand-lime brick.....	M. 7,074	40,534
Lime and cement.....	Bbl. 1,472,564	774,399
Total values.....		\$3,367,271

There was no production of arsenic, asbestos, fluorspar, graphite, quartz, rutile, nickel, or phosphate in Virginia, in 1908. Considerable development work was in progress during the year in the Nelson county rutile area. The results were encouraging and it is expected that the area will again be a producer in 1909.

Statistics of THE MINERAL INDUSTRY show that in 1908 the United States produced 32,000 short tons of calcium chloride valued at \$224,000. In 1907 45,000 short tons valued at \$450,000 were produced.

The 1908 production of zinc ore in the United States was 838,377 short tons against 902,923 short tons in 1907. These are the figures obtained for THE MINERAL INDUSTRY.

*State geologist, University of Virginia.

Views, Suggestions and Experiences of Readers

Comments on Questions Arising in Technical Practice and Debatable Points Suggested by Articles in the Journal

CORRESPONDENCE AND DISCUSSION

Electric Mine Signaling

The arrangement of electric signals at the Grand Hornu mine, described in the JOURNAL of April 24, 1909, is similar in many respects to that which has been in use in a number of collieries in the United Kingdom, for nearly thirty years. As far as there is any difference between the arrangements at the Grand Hornu mine and those in use at British collieries, the arrangements at Grand Hornu appear to me to be not so good. The use of the current from an electric-power service, in place of batteries, is a natural de-

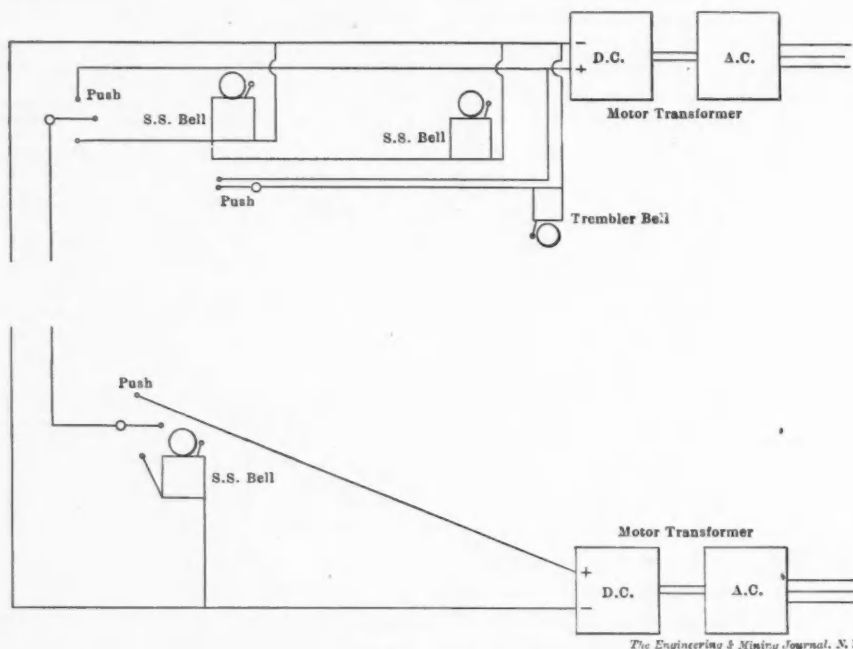
velopment but to my mind the use of alternating currents for signals is hardly wise, and the use of a live wire in the shaft is also unwise.

velopment but to my mind the use of alternating currents for signals is hardly wise, and the use of a live wire in the shaft is also unwise. We found in those days and the matter has not altered since, that a wire in which the current was always present, if fixed in the shaft, was much more liable to be eaten in two than the wires in which currents were only passing when the signal was being given. I found the best method was to have a battery at the top to work the down signal and that between bank and engine house, and another battery at the bottom to work the up signal.

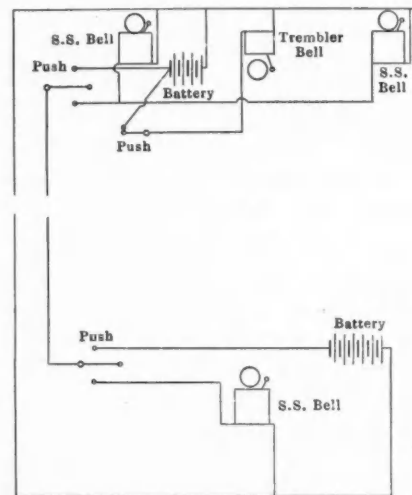
The modern equivalent of this would be a connection from a small motor generator at the top, to work the down signals,

the different signal wires, and the tendency is to use armored cables in the shaft for everything now. I do not see, either, the advantage of using alternating currents as far as the working of the bells is concerned. A bell to work with alternating currents is a more complicated affair than one to work with continuous current. A familiar instance of a bell working with alternating currents is the call bell of the telephone apparatus.

It also appears to me not to be quite sound for the home bell to ring at the same time as the distant bell. According to the description of the signals at the Grand Hornu mine, the onsetter at the pit bottom would ring his own bell, at the same time as he rang the bells on the bank and in the engine house. One of the most important conditions that were given to me, when I was working out the shaft signal thirty years ago, was that



SHAFT SIGNALS WORKED BY CURRENT FROM MOTOR GENERATORS AT TOP AND BOTTOM



SHAFT SIGNALS WORKED BY BATTERIES

velopment but to my mind the use of alternating currents for signals is hardly wise, and the use of a live wire in the shaft is also unwise.

In the early days of electric signaling, we had a great deal of difficulty with shaft signals, principally owing to the wires in the shaft getting eaten away. If the insulating envelope of the wire was damaged even slightly, the water that is always present in mine shafts found its way through to the copper and quickly ate it in two, with the result that it not only stopped the signals but it was difficult to find. With long experience, one got pretty expert at finding these faults but anyone coming fresh to the work,

and the signals between pit top and engine house, and the current from another motor generator at the bottom to work the up signals. It is a simple matter to arrange a motor generator, taking current from a three-phase supply service, and generating continuous currents for the signals, and possibly for other work, both at the top and bottom of the pit and in any intermediate seams.

One disadvantage of the use of alternating currents for signaling is that it is absolutely necessary to have the signaling wires in one cable, twisted round each other, or to place them very close together. It would not do to have separately armored or lead covered cables for

nothing of the kind must take place. The reason I think is obvious, viz., that confusion may be caused by it.

The special rules for colliery working in the United Kingdom state very clearly that a certain number of raps on a bell, or the equivalent, must be given and a certain number of raps received in reply. It might happen that the onsetter was signaling at the same time as the bankman, though that would not often occur, and the results might be disastrous. I may mention that while engine plane signals have been almost universally adopted in every colliery in the United Kingdom, shaft signals have only been taken up at comparatively few. The ac-

comparing diagrams show the connections of the signals as they are fixed in British collieries, with batteries, and as they would be arranged for taking current from motor generators.

SYDNEY F. WALKER.

Bath, England, May 12, 1909.

Filing System For Technical Papers

A mining engineer in the practice of his profession is called upon to move from place to place a great deal and he soon finds that he cannot afford to pack a large library around with him. A standard work on milling, one on smelting and another on ore deposits will probably form the extent of his library especially during the earlier years of struggling to the top. During these years a man must depend almost wholly on the magazines and journals of his profession to keep him posted. Text-books are necessarily a year or more behind the progress. The articles in the technical press are written by the men in the field, and are alive and up-to-date. Therefore a man who supplements his few standard works on mining and metallurgy with a filing system by means of which important articles from current literature can be filed for future reference is sure to be up-to-date in his reference library.

I have such a file which contains all the important articles bearing on methods of mining, milling and smelting, costs at different plants, financial and other company reports, geological data, discussions, etc., which have appeared in several American and Canadian journals during the past four or five years. This collection contains about 7000 pages, yet the whole file can be carried in one end of a suit case. There is probably nothing new in the method of making up this file and its index, yet it requires so little work in comparison to its great value that a short description may be of interest to readers of the JOURNAL.

The indexing is done in a small loose leaf pocket-book. This book is leather covered and has three steel rings which can be opened or closed by means of a sliding lever in the cover of the book. Such books are carried by all stationers. The one I use is 5x7 in. in size and has indexing letters from A to Z. Under each letter several pages can be inserted and each one alphabetically marked at the top as Aa, Ab, etc.

Should an article be devoted to one subject, as for instance a description of the Shannon concentrator, it would be entered in the index under

MV—Mills, description of
Shannon Cu. Co. 325.

Also, under *Ar*,—Arizona—Shannon Cu. Co. 325. I would also cross-index this to *Co*—Copper in Arizona, Shannon Cu. Co.

If the article also described the smelting plant and mining methods, under "*Sm*—Smelting" would be entered the page describing that operation and under "*Mi*—Mining at Shannon Cu. Co." the page on which is the description of that operation. Then under *Sh*—would be a heading, Shannon Cu. Co., and page numbers of all articles relating to that company or plant would be entered. In this way each article is divided into several heads and each one is indexed under its proper letter. Should I want general information on the Shannon Copper Company, I would refer to index letter *S*, turn to page *Sh* and the page numbers of all articles of every kind referring to that company would be together on one line thus:

Shannon Cu. Co. 318-577-618-1141.

However, should I wish to know only cost of production at that plant I would refer to index letter *C*, and find such items under

Co—Cost of
Shannon, milling at, 318
 mining at, 618
 producing Cu. at, 1141.

The pages are torn out of the journals and numbered in the center of the bottom margin. These are then placed in manilla envelopes large enough to hold two hundred pages without folding. The envelope is marked to show what pages are included within. In order to keep the pages together two holes are punched in the top margin and copper fasteners put through and clinched, thereby binding together the two hundred pages. An extra envelope can be used for unindexed sheets yet even the busiest man if he finds time to read the articles can do the indexing as he goes over the articles and with but little loss of time.

Any number of pages can be placed in the index book up to its capacity. I have over 7000 pages of articles indexed yet the small book is not one-quarter full and can easily be carried in the pocket. While the file of articles can be carried in the suit case and still leave room for other necessary articles; yet what a live comprehensive reference library it is.

D. F. HALEY.

West Gore, Nova Scotia, May 20, 1909.

Prevention of Mine Accidents

The Committee on Prevention of Accidents in Metalliferous Mines, appointed by the American Mining Congress, expects to make a report at the forthcoming meeting of the American Mining Congress at Goldfield, Nev. This report will take the form of the presentation of a code covering provisions that are deemed necessary to promote safety in mining. Much importance is attached to this report, inasmuch as it is likely to be the basis for legislation by several States.

Already a commission to draft a mining law for Arizona has been appointed, and that commission is awaiting the report of this committee.

In the first report of this committee, published in the ENGINEERING AND MINING JOURNAL of Dec. 5, 1908, and republished in pamphlet form by the American Mining Congress, summaries of the existing mining laws of several States were presented. The hope was expressed that these publications would have led to suggestions as to provisions that ought to be included in, or excluded from, a composite and improved mining law.

The committee now urges particularly that anyone having suggestions to offer respecting the workings of the existing laws of Colorado, Montana, Idaho, Missouri, and other States, or features in those laws that should be excised, or new provisions that should be incorporated, communicate promptly with the unsigned, in order that the committee in its deliberations may have the benefit of such suggestions.

W. R. INGALLS,
Chairman.

505 Pearl street, New York, June 11, 1909.

Michigan Gypsum

By JAMES L. NANKERVIS*

Gypsum is found in remarkable abundance and purity at Grand Rapids and Alabaster, and in moderate quantities at various other places. This mineral is very properly classed among the useful products of the State and its production and manufacture form an important and a growing industry. The output of gypsum in Michigan in 1908 was 250,000 tons, valued at over \$700,000. While the growth of the industry has been somewhat slow, yet it has been steady, wholesome and continuous. The stratum of gypsum at Grand Rapids is 18 to 20 ft. in thickness, and is found from 1 ft. to 16 or 18 ft. below the surface; it is fully 1000 ft. in extent, affording a very large supply to draw upon.

The development of the gypsum industry in Michigan is practically confined to Grand Rapids where the mineral is produced in considerable quantities and is ground and prepared as a basis for wall tintings, wall decoration, stucco work, plasters, fertilizers and other uses. For wall tintings and decorations alabastine and allied gypsum products are among the best things made. On account of the excellent sanitary properties of the articles and the ease with which the different preparations may be applied, they are becoming popular in the United States and in many parts of Europe.

*Ex-commissioner of mineral statistics, Calumet, Mich.

Production of Various Minerals in Kentucky During 1908

BY CHARLES J. NORWOOD*

Statistics are now available of the production of commercial coal, fluorspar and barytes in Kentucky for the calendar year of 1908. I have no hesitation in saying that these statistics are as complete as it is possible to collect. Data relating to the production of commercial coal are gathered monthly by the mine-inspection office and are checked and rechecked throughout the year, while the data for fluorspar and barytes are gathered by the Kentucky Geological Survey through personal visits made by F. Julius Fohs, of the Survey, and are checked in various efficient ways.

OUTPUT OF COAL

The production of commercial coal amounted to 9,805,777 short tons, a decrease of 630,284 tons, as compared with 1907. The losses occurred in the western and southeastern districts, the loss in the former being 526,186 tons, and in the latter 184,687 tons. The northeastern district gained 80,589 tons. The output for 1908 by counties, arranged according to districts, is given in the accompanying table.

KENTUCKY COAL PRODUCTION IN 1908.

WESTERN DISTRICT.

County.	Tons.
Butler.....	4,968
Christian.....	33,191
Daviess.....	52,658
Henderson.....	226,152
Hopkins.....	1,772,253
McLean.....	97,287
Muhlenberg.....	1,774,314
Ohio.....	602,316
Union.....	513,015
Webster.....	558,442
Total.....	5,634,596

SOUTHEASTERN DISTRICT.

County.	Tons.
Bell.....	1,434,742
Knox.....	520,089
Laurel.....	212,585
Pulaski.....	69,634
Whitley.....	813,541
Total.....	3,050,591

NORTHEASTERN DISTRICT.

County.	Tons.
Boyd.....	79,763
Breathitt.....	24,043
Carter.....	78,509
Floyd.....	52,857
Johnson.....	154,459
Lawrence.....	24,751
Lee.....	92,533
Morgan.....	62,290
Pike.....	551,385
Total.....	1,120,590

The disposition of the product was as follows: Sold locally, 301,283 tons; used at the mines, 261,273; converted into coke, 85,449; shipped to market, 9,157,772. Of the total output, 70,413 tons were of cannel coal. The average selling value of the latter, at the mines, was \$2.439 per ton. With cannel included, the average selling value of all coal was \$0.997 per ton, but dealing with the bituminous alone, the average selling price per ton

*State geologist and chief inspector of mines, Lexington, Ky.

for the various districts was as follows: Western, \$0.9081; southeastern, \$1.1414; northeastern, \$0.9580; general average, \$0.9856; total value, \$9,605,025. When comparing figures issued by the U. S. Geological Survey with those given by this office, it should be remembered that the former organization undertakes to report the production of all "banks," whether large or small, while this office reports only commercial coal.

Of the coal shipped from the mines, 57.74 per cent. was sent to other States, the western district and northeastern district being the largest shippers to outside markets. A fraction more than 56 per cent. of the total product was mined by machine, the proportion in each district being as follows: Western, 70.52 per cent.; southeastern, 32.56 per cent.; northeastern, 49.52 per cent. In the production of coal, 18,611 persons were employed of which 14,522 were engaged under ground and 4089 employed at surface works, including coke ovens. But little coke was made during the year. The St. Bernard ovens, in Hopkins county, turned out 36,416 tons; the ovens of the Ohio Valley Coal and Mining Com-

PRODUCTION OF FLUORSPAR IN 1908

The statistics of the production of fluorspar were gathered with especial pains to obtain correct returns. As in 1907, the production was confined to Crittenden and Livingston counties. The tonnage mined was 25 per cent. less than in 1907, though greater than in 1906, and the shipments fell below those of any year since 1899. The tonnage held in stock at the beginning of 1909 was greater by almost 3000 tons than for any previous year. The amount of lump shipped was small, being almost entirely replaced by gravel. The production came from nine mines, the bulk, in fact, from five, whereas more than twice that number were necessary to yield about the same amount in 1906 and 1907, showing that with a certain amount of development any of the good fluorspar mines can become much larger producers. The statistics of production, shipments, etc., for 1907 and 1908 are arranged for comparison in the accompanying table.

In 1908 the prices in Kentucky ranged from \$4.35 to \$6 for gravel, \$5.50 to \$7 for second- and third-grade lump, and \$9 to \$15 per short ton for ground fluorspar.

FLUORSPAR PRODUCTION, 1907 AND 1908.

MINED.		MARKETED.						IN STOCK Dec. 31.		
Year.	Tons.	Gravel.		Lump.		Ground.			Totals.	
		Tons.	Value.	Tons.	Value.	Tons.	Value.			
1907	15,918	6,433	.....	1,033	.....	6,030	.....	13,496	8,876
1908	12,010	2,840	\$14,226	307	\$1,828	3,176	\$32,588	6,323	\$48,642	12,899

pany, in Union county, produced 1837 tons; the ovens of the Straight Creek Coal and Coke Company, in Bell county, were idle nearly all the year, producing only 100 tons.

There were 39 fatal accidents, as follows: Inside mine, 35; in shaft, 1; on surface, 3. This was an increase of 7 over the number for 1907. Considering accidents inside the mine only, the increase was 10. This was due to two explosions caused by blown-out shots and to an increase of 5 in the number of deaths due to falls of top. It is not improbable that the increase of fatal falls of top was in some measure due to the crippled condition of the mine-inspection bureau for a good part of the year; the increases occurred in districts that were without inspectors for some time, whereas in the districts having inspectors there was a decrease. In one of the explosions a blown-out shot caused the explosion of a keg of powder, killing 3 men; in the other, a blown-out shot set fire to coal dust and 9 men died from the effects of the afterdamp. In this State, blown-out shots seldom occur except where coal is shot on the solid. Mining on the solid should be explicitly prohibited by law; there seem to be difficulties in the way of many of the operators who may attempt to make a "rule" against it.

The average price for all grades was \$7.69. The first six months of 1908 proved the dullest for the fluorspar industry that had been experienced for a number of years. The companies report a falling off in business of from 35 to 80 per cent., averaging less than half as compared with the same period in 1907. This, however, was in accord with the general depression in the business of the country, the chief factor affecting the fluorspar industry being the slack demand that followed the shutting down of iron and steel plants. Since the larger number of shutdowns were in the South, the reduced demand for fluorspar from that section was especially felt by Kentucky operators. The demand for fluorspar in other industries, especially glass, was also less. The resumption of work at many of the iron and steel plants, and the blowing-in of new furnaces during June, especially in the South, caused a better demand for the remainder of the year.

But when the demand from steel plants increased, there were still two factors which prevented Kentucky from getting its share of the business, namely, underselling by one of the large Illinois producers, and the severe competition offered by the imported English fluorspar. The greater factor is the annual importation of 100,000 tons of gravel fluorspar, duty free,

from English waste dumps. The cost of this product, according to excellent authority, is \$2.19 to \$2.59 per long ton laid down at Partington and Liverpool. The ocean freight rate is \$1.22, making a total of \$3.41 to \$3.87 per long ton at Atlantic ports. The freight rate from Baltimore to Pittsburg is \$1.50, making a total cost of \$4.91 to \$5.37 per long ton, or \$4.38 to \$4.74 per short ton, at Pittsburg. The sale price at Pittsburg is said to be such as yields the English shippers a fine profit.

On the other hand, the cost of producing gravel fluorspar in western Kentucky (not allowing for mine depreciation, etc.) is reported by one company at \$4.48 per short ton. The average selling price in 1908 was \$5.01. Another company gives as the average cost of all grades \$6.22 per ton, the average selling price for 1908 being \$7.60. The freight rate from western Kentucky to Pittsburg is \$2.50 per ton. Manifestly, it is impossible to compete with the duty-free foreign fluorspar, and unless a countervailing duty is laid on gravel fluorspar one of the promising young industries of this State must suffer greatly. Since the average maximum amount of fluorspar used per ton of open-hearth steel does not exceed 15 lb., an equalizing tariff laid on gravel spar would not materially affect the cost of steel production.

Kentucky producers, and some of the Illinois producers as well, have refused to sell fluorspar unless a living price can be obtained and have, therefore, either curtailed production or piled up large stocks. In the discussion of the fluorspar and tariff question it has been asserted by some that in this country, as in England, the spar is a by-product from lead mining. That this is entirely erroneous, however, is shown by the fact that in the Kentucky-Illinois district, whence comes practically all the American spar, the lead production is small; there were only 107 tons of lead concentrates produced from more than 12,000 tons of Kentucky fluorspar in 1908.

silver probably came from some lead concentrates made at a Kentucky mill from Rosiclare, Ill., ore.

The following companies mined or marketed fluorspar from Kentucky mines during 1908: Albany Mining and Investment Company, Marion; Blue Grass Fluorspar Company, Princeton; Great Northern Mining and Development Company, Marion; Indiana & Kentucky Fluorspar and Lead Mining Company, Marion; Kentucky Fluorspar Company, Marion; Sunnybrook Lead and Fluorspar Company, Marion; and R. L. Moore & Co., Marion. The following did development work: James M. Pearsons, Marion; Pope Mining Company, Salem; and the Kentucky & Indiana Mining Company, Francis.

BARYTES IN 1908

Notwithstanding that in "Mineral Resources" for 1906 and 1907 Kentucky was assigned to a very minor position as a producer of barytes, and that in articles on barytes by various "experts" this State is not even named, Kentucky is really a very respectable producer of that mineral, and it is the belief of the State Geological Survey, as the result of field work that has been in progress for some months, that the Central Kentucky district is, all things being considered, the greatest barytes district in this country.

The production for 1906 amounted to 3375 short tons, valued at \$15,187; for 1907 it was 9435 tons, valued at \$44,059. In 1908 the amount mined was 11,051 tons. Of this a certain amount was used for making blanc fixe, concerning which we may not publish details, since the one concern making it does not authorize such publication. During the year 5233 tons of crude, valued at \$21,504, and 3300 tons of ground, valued at \$39,600, were shipped and a certain amount was stocked. At the close of 1908, 5904 tons were reported in stock. The average value of crude barytes was \$4.11 per ton, and that of ground, \$12. The average prices for both crude

samine, Lincoln, Owen, Scott and Woodford. Boyle, Fayette and Garrard were the largest producers, in the order named. Excellent deposits also occur in Henry, Mercer and Russell counties, especially in the first two, but there was no production in 1908.

The Dix River Barytes Company intends to erect a mill for grinding and bleaching barytes at Danville, Boyle county, and the Kentucky Barytes Company contemplates the erection of a plant for the production of blanc fixe and barium by-products; the company now has a grinding plant at Nicholasville, Jessamine county. The Mutual Mining Company is enlarging its blanc-fixe and lead-fume plant, and is adding equipment for the manufacture of paint. No lead or zinc shipments were made from the Central Kentucky district in 1908. About 60 tons of lead concentrates were produced. The Mutual Mining Company manufactured blanc fixe, sodium sulphide, and depilatory throughout the year.

The field study of our barytes deposits is in the hands of F. Julius Fohs, by whom the statistical data were gathered. As the work of the Survey proceeds a large number of veins have been brought to light, some of them extending four to five miles in length. In Fayette county alone 32 veins have been investigated, two-thirds of which Mr. Fohs considers profitably workable. The average width of the veins is 3 ft., but enlargements occur measuring over 10 ft. in width. The barytes is known to extend downward, nearly vertically, to a depth of 250 to 300 feet.

Annual Report on Production of Butte Mining Companies

The annual reports of the mining companies, required by law to be filed with the country assessor, were made public last week and show the earnings for 1908.

REPORT OF BUTTE MINES FOR 1908.

	Anaconda.	Boston & Montana.	Butte & Boston.	North Butte.	Washoe.	Butte Coal.	Trenton.	Parrot.
Tons of ore extracted.....	1,316,893	1,185,142	355,702	491,951	208,675	424,752	168,818	147,858
Gross proceeds.....	\$11,963,134	\$12,087,072	\$3,212,726	\$4,948,329	\$1,543,062	\$3,722,322	\$1,242,725	\$1,057,385
Cost of mining.....	5,460,937	4,730,533	1,322,887	1,636,167	759,938	1,623,980	614,045	608,138
Freight on ore.....	162,441	763,288	78,079	59,118	25,524	70,691	20,275	21,733
Cost of reduction.....	2,946,242	4,285,768	835,923	1,413,600	604,154	1,568,488	350,376	439,734
Cost of marketing.....	1,313,642	902,698	329,637	.....	.....	.....	121,129	.....
Total cost.....	9,883,263	10,682,289	2,566,528	3,108,886	1,389,618	3,263,161	1,105,826	1,069,606
Net earnings (1908).....	2,079,871	1,404,783	646,198	1,839,442	153,444	459,160	136,898	def. 12,221
Net earnings (1907).....	1,132,875	1,561,061	295,605	1,113,647	246,096	71,810	67,259	def. 139,372

None of the 107 tons of lead concentrates was sold owing to the low price of lead in 1908. No zinc was mined, but 56 tons of zinc carbonate were shipped from the Crittenden Springs and Keyes mines. Perhaps it will be well to state here that the returns of 2 oz. of silver per ton from some "Kentucky" lead reported by Mr. Siebenthal in "Mineral Resources" for 1907 was an error; no Kentucky lead has yet shown commercial silver returns. The

and ground mineral were less than for 1907, and the indications are that the prices for 1909 will be still less.

Although there are deposits of barytes in Caldwell, Crittenden, and Livingston counties, in western Kentucky, the barytes industry is still confined to the Central Kentucky district, and in 1908 work was carried on in thirteen counties, namely: Anderson, Bourbon, Boyle, Clark, Fayette, Franklin, Garrard, Harrison, Jes-

in view of the low price of copper and the general business depression prevailing during the year, the companies, as a group, have made a good showing. The total net earnings for the year were \$6,732,015 as compared with \$4,648,254 for the year 1907. The accompanying table embodies the reports of eight of the large companies, also the net earnings of the various companies for 1907 by way of comparison.

Personal

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Henry F. Lefevre has returned to New York from Nicaragua.

Julius W. Hegeler, of Hegeler Brothers, Danville, Ill., has been visiting New York.

T. H. Leggett has returned from a sojourn of several months in Sonora, Mexico.

W. C. Thomas, of Salt Lake City, Utah, has gone to Wales for a vacation of four months.

J. Parke Channing has returned to New York and will be here until the end of this week.

Elton W. Walker has returned to Detroit, Mich., from a trip to the silver districts of northern Ontario.

Ernst Schmatolla, of London, has established an office as consulting engineer at 150 Nassau street, New York.

H. C. Wilmot has opened an office as consulting mining engineer in the Newhouse building, Salt Lake City, Utah.

Jay P. Graves, of Spokane, Wash., managing director of the Granby Consolidated Company, is recovering from a serious illness.

Dr. Wilbur A. Hendryx, manager of Hendryx Cyanide Machinery Company, of Denver, Colo., is in New York on professional business.

George Alexander, manager of the Ferguson Mines, Ltd., and the Kootenay Ore Company, has returned to Kaslo, B. C., having spent the winter in Europe.

Charles H. Gitsch, recently of Park City, Utah, has been appointed superintendent of the Antelope Spring and Nevada Superior mines in Humboldt county, Nevada.

C. S. Herzig, who has been in Nicaragua for a number of months examining mines on behalf of the Oroya Brownhill Company, Ltd., of London, is expected in New York soon.

Lester W. Strauss is on his way to the western part of the department of Ayacucho, Peru, to examine a partially developed gold prospect. He expects to return to Lima, Peru, in June.

James McEvoy, formerly with the Geological Survey of Canada, has gone into the big coal district lying between Banff and Edmonton, Alberta, for the German Development Company, of Ottawa.

John Fritz, the veteran ironmaster—well called "the father of the American iron trade"—has presented \$50,000 to Lehigh University at Bethlehem, Penn., to be used to build and equip a metallurgical laboratory.

J. C. Gwillim, professor of mining at the School of Mines, Kingston, Ont., is spending a week or two at the St. Eugene mine

East Kootenay, B. C. Last month he did some geological work near Hosmer, Crow's Nest Pass.

James Hargreaves has resigned as mine manager for the Canada West Coal Company, Ltd., Taber, Alberta, to become superintendent of the Alberta Consolidated Coal Company, operating about four miles west of Taber.

George W. Schleuderberg, who has had charge of the mining department of the Pittsburg Coal Company since its organization, will retire from that position July 1. He is one of the oldest operators in the Pittsburg district.

K. C. Parrish sailed recently from New York to resume his duties as manager of the Andes Mining and Development Company in the district of Guamoco, Colombia. Part of his time will be spent in making mine examinations for other interests.

Louis A. Wright has been appointed consulting engineer in the Southwest and Mexico to the General Development Company; also consulting engineer to the Miami Copper Company. His headquarters will be at Globe, Arizona, for at least a year.

John D. Ryan succeeds the late H. H. Rogers as president of the Amalgamated Copper Company. B. B. Thayer takes Mr. Ryan's place as president of the Anaconda Copper Company. F. P. Addicks, vice-president of the Amalgamated is now vice-president of the Anaconda also.

Dr. Alfred C. Lane has resigned his position as State geologist of Michigan, to take effect Sept. 1 next. He expects then to take a position at Tufts College, and also to be able to concentrate his attention on the study of certain geological problems having a direct bearing upon mining.

H. A. Prosser resigned, on June 1, his position as metallurgical director of the United States Smelting, Refining and Mining Company, a concern with which he had been connected practically from its beginning, during which time he supervised the construction of the smeltery and refinery at Chrome, the refinery at Grasselli, the smeltery at Kennett, Cal., and the enlargement of the smeltery near Salt Lake City. Mr. Prosser has associated himself with Arthur L. Walker, and the firm, under the name of Prosser & Walker, has opened an office at 42 Broadway, New York, as consulting metallurgical engineers.

Obituary

Frank A. Lucy was killed June 7 by falling down the main shaft at the Florence mine in Goldfield, Nev. He had been prominent in the district and in other parts of Nevada for several years, and had recently been appointed superintendent of the Florence.

Louis G. Laureau died at Yonkers, N. Y., June 6, aged 68 years. He was long

associated with the late Alexander L. Holley, as his chief assistant, was for a while a member of the firm of Gordon, Strobel & Laureau, and for many years acted as a metallurgical expert in patent causes. He possessed an accurate knowledge of the steel industry of this country, and of Belgium and France.

Societies and Technical Schools

Georgia School of Technology—The latest catalog of this school at Atlanta shows courses in chemistry and chemical engineering; also in geology and metallurgy, especially the metallurgy of iron. The course in chemistry especially appears to be thorough and comprehensive.

University of Utah—The junior class in mining engineering is making a geological examination of the Pioche district under the direction of the Department of Geology. The class expects to spend six weeks in the district in surface and underground mine surveying and examination. The senior class recently returned from a month's trip throughout the West, visiting important mining districts.

Wisconsin State Mining Trade School—Three students graduate from this school, at Platteville, Wis., this year. This is the first class to graduate from the institution. These men will enter the employ of mining companies in the Wisconsin zinc district. All the other members of the student body will be engaged for the summer by some of the mines of the district.

Missouri School of Mines—A mining experiment station is to be established at Rolla. The legislature appropriated \$10,000 at the last session for this purpose, and the executive committee of the board of curators, has decided to begin work on the new station immediately and have it ready for work by Sept. 1. The experiment station will be in charge of the assistant professor of mining. An assistant for the experiment station will also be appointed.

The graduating exercises at Rolla were held June 9, when 37 men received degrees.

Chemical, Metallurgical and Mining Society of South Africa—At the general meeting in Johannesburg, Transvaal, May 15, the following new papers were read: "Stope Measurements," by O. S. Tonnesen (illustrated). "The Influence of Moist Air on Quicklime," by James Gray. "The Telluride Gold Ores of Cripple Creek, Colo.," by Thos. B. Crowe. The following papers came up for final discussion: "Precipitation of Cyanide Solutions by Zinc; a Comparison of Results and Costs," by Allan J. Clark. "Unskilled White Labor in Mining," by Tom Johnson. A number of other papers were ready for discussion.

Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives at San Francisco, Butte, Denver, Salt Lake City, Goldfield, Colbalt, Mexico

REVIEWS OF IMPORTANT EVENTS

San Francisco

June 11—The State president of the Western Federation of Miners is at present very actively engaged in organizing miners' unions, more particularly in Sierra county and northern Nevada county. The attempt to do this in Amador county was not at all successful. The president expects to unionize all camps where a membership of 20 can be obtained, that number being requisite to obtain a charter.

The largest gold dredge yet constructed in the Yuba field has just been completed at Marigold, at a cost of about \$200,000. The machinery, now being installed in the hull was built at Marysville in the shops belonging to the dredging company. This dredge is expected to dig 45 ft. below pond level and to stack 45 feet.

Chas. S. Warren, of Butte, Mont., R. E. Bannan, W. W. Warren, of Gold Circle, and Frank G. Mitchell, of Cleveland, O., have bonded several mining properties in Yuba county for \$70,000 and work will soon begin on a large scale. Included in the bond are the Red Cross mine near Indiana ranch, owned by Krupp & Quinlan; the Good Templar, 30 miles east of Marysville, owned by Williams Brothers; and the Merriam property. There are small mills on both the Red Cross and Good Templar.

The dispute between the city of Oroville and the Indiana Gold Dredging Company, which has lasted a long time, has finally been settled. The injunction against the dredging company for interfering with the free flow of the water in the Feather river, has been removed. The dredge company agrees to level all the cobble piles it makes with its stacker as it goes along, not leaving them to form a barrier in the river bed. The company will also reimburse the city for the money spent in prosecuting the case, and will in return be permitted to continue operations until its land is dredged out. This is one of the two dredging companies in the State working ground where the cobble piles had to be left in the direct river bed. Most of the dredges are operating some distance from the rivers proper.

At the same place the Pennsylvania Dredging Company has settled its difficulties and agreed to reduce its cobble piles by leveling them off. No other dredges there are working in the river bed.

The local mint has just made a record run on gold coinage. This week it finished a 50-day run on gold, amounting altogether to \$52,062,500 or \$1,070,000 daily for the 50 days. On the last day

the coinage was \$1,520,000 gold. A large amount of gold had collected and large quantities have been coming in lately, but it has now been pretty well cleaned up. The Alaska and Klondike gold will now be coming in for the season as well as much California and Nevada gold, so there will still be plenty to do.

Lieutenant Chas. L. Leeds of the Corps of Engineers, U. S. A., has been appointed a member of the California Débris Commission which, under the Caminetti law, has charge of the conduct of hydraulic mining in certain portions of the State of California. Since the retirement of Col. W. H. Heuer, the miners have had rather a hard time of it as the new members hold rigidly to the strict letter of the law and have not, thus far, evinced any special friendship toward the miners, or encouraged the hydraulic mining industry in any manner. There has been much complaint on the part of miners, but the operation of the law has been in the hands of the Commission entirely, they having the final decision on all questions relating to hydraulic mining. There is a hope now that the new member will take an interest in the hydraulic mining question, look after details, and have some little sympathy with the cause of the miners.

The new find in the Old Cape mine four miles east of Humbug, Siskiyou county, is in one of the old tunnels. In addition to the gold and silver there is a good percentage of copper so that the ore will have to be shipped to a smelter. The property is now owned by Bulis & May. In former days there were no smelters near by and the "base" ore could not be worked, the owners being satisfied to take out what gold they could and let the balance go.

The old camp of Challenge Mills, Yuba county, is again showing activity after many years of idleness. A great deal of prospecting is being done by men from Nevada. The old placers are now yielding from \$500 to \$1000 per day during the water season.

The Supreme Court has reversed the decision of the lower court of San Diego county giving judgment for \$116 against H. H. Markham and Geo. Coffin, president and secretary of the American Boy Mining Company, charged by a stockholder with having misappropriated that sum from the company. The American Boy company some time since bought the adjoining American Girl claim and formed a new corporation. It was stated in the

complaint that Markham and Coffin had given shares in the company to friends without compensation. It was shown to the court, however, that the money had been utilized in promoting the development of the mines.

Butte

June 10—President Anderson, of the Idaho Smelting and Refining Company, states that he hopes to effect an agreement among the company's creditors whereby operations may be resumed at the smelter. The control of the company's affairs is now in the hands of Temporary Receiver Bruce Blake, appointed by the Federal bankruptcy court. Mr. Anderson believes that the creditors will agree to an arrangement for the settlement of all claims and thus avoid the heavy costs attendant upon the completion of bankruptcy proceedings.

In March of this year, E. W. Beattie, of Boston, secured a judgment against the Bald Butte Mining Company for the sum of \$20,145. A petition asking for leave to intervene in the suit has been recently filed by Frank J. Edwards, of Helena, a stockholder of the company, who asks that the case be reopened and that he be allowed to come in and defend. The petition alleges that the company was never indebted to Beattie in any sum, and that the two notes on which the Beattie action was based were given without any consideration whatever. It is further alleged that the total indebtedness of the company does not exceed the sum of \$12,000 as shown by its annual report of 1908, which was signed by Mr. Beattie as a director of the company.

The annual report of the Butte Coalition Company for the year 1908 has recently been made public. There were produced, during the year, 264,031 tons of ore, 18,521,282 pounds of copper, 300,192 oz. of silver, and 1831 oz. of gold. A total of 900 men are employed by the company.

The Great Northern Railway has recently issued a new tariff on ore rates between the principal shipping points in the State. The tariff is made retroactive and dates from April 27, so that all ore shipments made since that time are subject to rebates. A change is made in the basis of ore valuation, the new schedule classifying all ores exceeding \$100 valuation at the \$100 rate, instead of adding 20 per cent. to the rate for each \$50 increase. It is expected that the re-

sult will be a material benefit to the shipper.

At the annual meeting of stockholders of the Reins Copper Company held in this city a few days since the following directors were elected: J. M. Guffey, T. N. Barnsdall, John H. Gailey, William P. De Armitt, F. W. Marland, W. F. Johnson, George D. Prentice, A. P. Childs, Augustus Hartje, all of Pittsburg; John P. Reins and Glenn L. Thompson, of Butte.

Denver

June 11—The monthly measurement of the work performed under the Carlton contract at the Roosevelt deep drainage tunnel in the Cripple Creek district shows a total distance driven during May of 954 ft. At the north heading from the intermediate shaft 290 ft. were driven and at the south heading 262 ft. The portal heading was driven 402 ft., bringing the total distance from portal to breast up to 6288 ft., and the total distance covered in all three headings to date is 9378 ft. On June 1 there remained 227 ft. between the south heading of the intermediate shaft and the portal heading and it was expected that the connection will be made about the middle of June. During the last 15 days of May the picked crew in the portal heading drove the tunnel 246 ft. or at the rate of over 16.4 ft. per day. In this work there was used a new model machine, in which three Leyner drills were set up on a bar at the breast of the tunnel.

At the recent annual meeting of the Gold Dollar Consolidated Gold Mining Company at Cheyenne, the present management was sustained and H. L. Shepherd, of Cripple Creek, was re-elected president, with other officers and directors as follows: A. E. Carlton, treasurer; J. R. Young, secretary; E. E. Quentin and J. W. Hughes, directors. Of the 2,068,000 shares represented at the meeting, it is stated that the opposing faction controlled only 308,000, notwithstanding the fact that circular letters had been issued some time since making violent attacks upon the Carlton management. Announcement was made that the company will continue the regular payment of quarterly dividends of $\frac{1}{2}$ c. per share.

According to reports from London, the April production of Stratton's Independence mine was 2263 tons of an average value of \$22.75. There were treated at the company's dump mill during the same period 3100 tons. No figures, however, are given of the average value of this dump rock, but the profits accruing to the company from "both mining and milling departments" was \$11,390.

Ore shipments from Silverton for May aggregated 4525 tons, 150 tons being high-grade crude ore and the balance concentrates. The total would have been close to 6000 tons, if it had not been for the fire at the Gold King mine. The mine buildings which were burned about the

middle of May will be replaced by modern steel structures. Repairs are being made on the aerial tram and when these are finished, temporary quarters will be provided for the men and work resumed in the mine. It is stated that the mine was in excellent condition at the time of the fire.

At a meeting of the Portland Gold Mining Company on June 9, it was announced that construction of a 300-ton cyanide mill at the mine near Victor will be commenced at once, and it is hoped will be ready for operation by the end of the year. The low-grade ore from the mine and the immense dumps will be treated, and it is stated that the experimental tests have shown that \$2 ore can be treated at a profit. At the Isabella, which also has its cyanide mill at the mine, it is also stated that \$2 ore is being treated successfully, and that during the past month they treated daily 125 tons of the above value, and that the bar sent to the Denver mint was worth \$7500.

The Moose mine which produced half a million in the early days of Cripple Creek, and has been practically abandoned for years owing to the gas in the workings, is now going to be made capable of exploration for new orebodies. A connection will be made with the 1000-ft. level of the Cresson company, which has taken a bond and lease on it.

Indianapolis

June 14—There was, during the past week, greater buying for both manufacturing and storing purposes. It is understood that the requirements of the railroads were such as to put into service nearly all of the empty cars. Orders for later delivery are being placed more freely and numerous inquiries are received as to prices and facilities for immediate and future shipments. Operators say the reports from leading industries are favorable.

The retail coal dealers of Indiana are stocking up more than usual. The prices at the mines have not been increased, but there are indications of a raise July 1. The retail dealers have announced a strictly cash basis on which prices have been cut 15 to 20 per cent. in order to induce consumers to lay fuel.

Oklahoma

June 12—Secretary of the Interior Balingier has prepared new regulations governing oil and gas-pipe lines in Oklahoma, and will make them public soon. Meantime he announces that the point of the changes consists in eliminating from the regulations the "common-carrier clause" and the so-called "confiscatory clause." These changes have undoubtedly been under consideration at the department for some time, but they were not made until a public hearing was given to representatives of all of the pipe-line companies operating in Oklahoma, to the Mid-Continent Oil

Producers' Association and others. The "common-carrier" clause in the old regulations seemed to be no longer necessary because of the fact that the new State of Oklahoma has passed an act fully covering the subject, and because more than 70 per cent. of the oil-producing land in Oklahoma has been taken out of the control of the Department by the act which removed restrictions from the Indian lands, and which went into effect July 27 last. The so-called confiscatory clause in the old regulations permitted the Secretary to cancel a grant to a pipe-line company if it violated any of the regulations of the Department. With this clause out, the question of the pipe-line's violation of regulations and law and a forfeiture of its franchise will be left to the courts to determine. The capacity of pipe lines operating in Oklahoma has proved wholly inadequate to handle the product, and this condition has existed for some years. Only about 50 or 60 per cent. of the production is handled by the present pipe-line companies. As a consequence more than 55,000,000 bbl. of oil have been stored in the field and much oil is going to waste. No new companies have recently ventured in the field on account of the two clauses in the regulations.

Salt Lake City

June 10—The production of coal is becoming one of Utah's most important industries. The report of E. W. Parker, of the U. S. Geological Survey, shows the total production for 1908 to be 1,848,792 short tons, having a value of \$3,119,338. Although the coal production decreased in sympathy with the general business depression throughout the country, an increase is reported in the value of the product. The report shows that 2664 men are employed in the mines. The areas in Utah known to contain workable beds of coal are estimated by M. R. Campbell, of the Survey to aggregate 13,130 sq.m., and there are in addition 2000 sq.m. of which little is known, but which may contain workable coal beds. The original contents of these fields are estimated by Mr. Campbell to have been 196,458,000,000 short tons of coal. The total production since mining began in 1870 to the close of 1908 has amounted to 20,683,974 short tons. On the basis of one-half ton wasted for every ton of coal mined and marketed, the exhaustion during this period has amounted approximately to 31,000,000 short tons, or 0.016 per cent. of the original supply.

The new Tooele Valley railroad, the line that connects the International Smelting and Refining Company's smelter site at the mouth of Pine cañon, was opened to traffic on June 10, the first train consisting of five cars of cement, lumber and other material for the new plant. Now that this road is opened the work on the smelter will progress rapidly.

The shipments from the Tintic district

during the week ending June 4 amounted to 219 cars of ore, and of this number 96 cars were of 50-ton capacity. The other cars were of 20-ton capacity. The output follows: In small cars, Iron Blossom, 38; Brooklyn, 1; Colorado, 31; Beck Tunnel, 6; Dragon Iron, 33; Black Jack, 2; Swansea, 2. Large cars, Ajax, 1; Grand Central, 6; Lower Mammoth, 1; Victor Consolidated, 1; Sioux Consolidated, 14; Iron Blossom, 2; Yankee Consolidated, 2; Bullion Beck, 3; May Day (crude ore), 6; May Day (concentrates), 2; Centennial Eureka, 42; Eureka hill, 4; Mammoth, 10.

Goldfield, Nevada

June 8—Figures compiled by the Goldfield Mine Owners Association regarding the number of men working in the mines of the district, show 1065 men employed, exclusive of salaried employes of the various companies, which would increase the number about 250. In addition there are a number of properties being worked by the individual owners who would not appear in the total as given above.

State Mine Inspector Stuart and Deputy Inspector Ryan have completed their inspection of the Goldfield mines and report favorably on the methods employed, both on surface and underground, for the protection and safety of employees. Particular comment is made concerning the Consolidated and Florence properties, where the unusually large stopes are extremely well timbered and every precaution taken for the avoidance of accidents.

H. P. Henderson, superintendent, gives the following estimate of production of the Goldfield Consolidated for the month of May: Total tons extracted, 21,305; total extraction, \$767,000; total cost, \$145,000; estimated profits, \$622,000. The Mohawk and Jumbo claims are producing about 8000 tons per month of \$35 average value. The Red Top and Lucky Boy claims from 6000 to 7000 tons per month, averaging \$37 and the Combination about the same amount averaging \$45 per ton.

Cobalt

June 12—The Coniagas Mines, Ltd., are going to prospect more thoroughly the southeast corner of the property underground. Work is being started in the old shaft in the center of the town, and it is being pumped out preparatory to sinking. It is now down 18 ft. on a calcite stringer giving low values in silver.

A 25-h.p. plant has been installed at the Eastborne mine. This will be used to carry on development. The shaft, which is now down 40 ft., will be sunk an additional 75 ft. and crosscuts run to prospect the property. There are two small veins showing in the bottom of the shaft, but no values have been found as yet. The Silver Lode mine, adjoining the King Edward, has started up again.

In an upraise 45 ft. above the 150-ft. level of the King Edward mine, No. 7 vein widened from a mere stringer to between 2 and 4 in. of high-grade ore. No. 7 vein runs parallel to No. 5 vein 200 ft. to the west on which a strike was made a few days ago. A prospecting tunnel is being driven into the hill from the side of Cross lake, but nothing of value has as yet been found. The mill is treating 20 tons per day.

No. 4 shaft of the Pan Silver is down 215 ft., and at the 200-ft. level a crosscut is being driven to strike No. 4 vein.

At the present time the Silver Cliff is doing development work on Nos. 1 and 2 veins only, and it is expected that these workings will be connected within the month. The company will not undertake any extensive work until the air from the Hydraulic company is ready for distribution.

In the crosscut at the 65-ft. level of the Silver Cross mine, 57 ft. to the north of No. 2 shaft a vein of calcite carrying small values in silver has been discovered.

At the 87-ft. level of the main shaft of the Michigan Cobalt a station is being cut, and a crosscut will be run to tap the vein on which the shaft was started.

The Gifford Extension is running a drift on the vein 100 ft. west of the main shaft at the 80-ft. level, but no silver values have been found as yet. The shaft will be continued to the 125-ft. level.

The Cobalt Hydraulic Compressed Air Company, which is putting in a 5000-h.p. plant at Ragged Chutes, on the Montreal river, to supply air to the mines of the Cobalt district, expects to have the power ready for distribution about Aug. 1. Considering the amount of work still to be done, however, it is doubtful if this will be possible. The pressure at the mines is to be 100 lb. For the larger consumers when six or more drills are used, the air will be supplied by meter; the smaller consumers using five drills or under will pay a flat rate depending on the number of drills in use. The following rates have been fixed by the Hydraulic company. For the large consumers buying by meter, 25c. per 1000 cu. ft. of air at 100 lb. pressure. For the smaller consumers, for one drill per 10-hour shift, \$5; 2 drills, \$4; 3 drills, \$3.50; 4 drills, \$3.13; 5 drills, \$2.80. This leaves a wide margin in favor of consumption by meter, and it is probable that before the contracts are finally signed, the mine managers will get together to compel the company to supply the power at a uniform rate.

A matter of great interest is at present before the shareholders of the Temiskaming & Hudson Bay mine. Many offers have been made for this property and, although none of these has been accepted, there is a general feeling among the shareholders that something should be done in order that they may have stock that is readily negotiable. At present the number of shares is so limited, there be-

ing only 7761 issued, and their value is so high, that they cannot be placed on the market and anything like their true value realized. A general meeting was called June 4 to discuss a proposition made by a broker. His idea is to form a new company to acquire the holdings of the Temiskaming & Hudson Bay, the capitalization to be from 3,500,000 to 5,000,000 shares of a par value of \$1. This stock is then to be handed over to the original company and sold through the brokers at about 75c. on the dollar. The matter was taken up at the general meeting and, although nothing definite was arrived at, it would not be surprising if some action were taken in the near future. The company will pay another dividend at an early date.

The Nancy Helen mine has closed down, but prospecting will be continued with the aid of a diamond drill. It is understood that an offer by a New York firm of \$4,000,000 for the O'Brien mine has been turned down. The Hargraves mine is running two drills in the shaft and one in the drift. The shaft has reached a depth of 275 ft.; at this point a station will be cut and a crosscut started. Some work has been done at the 70- and 175-ft. levels, but so far ore has not been struck.

The new vein recently found at the Beaver has turned at an angle with its general direction and the ore has disappeared. This is a common occurrence, however, in this locality and the management confidently expects to get the ore again in a short time.

Mexico

The new freight rates on coal and coke on Mexican railroads went into effect on June 1. It is claimed that these rates will keep at home fully \$5,000,000 annually that has heretofore gone out of the country.

The coal mines of the state of Coahuila, by new methods of cleaning and washing coal and the development of new coal measures, are now prepared to furnish coal and coke over the republic. Several years ago when Mexico could not supply the demand for those two important fuel staples the railroads adopted coal and coke rates which greatly favored the foreign product. During the last six years a wonderful development of the coal resources of Mexico has been steadily in progress, and now the coalmen can justly claim they are prepared to supply the trade. The railroads have been brought to a realization of the fact that the rates on the foreign coals which have prevailed on the roads for years have discriminated against the native product. The new rates equalize the matter. There is no favoritism of rates shown now to ports of entry as against rates from internal points. Mexico has no important duty on coal and coke.

Mining News from All Parts of the World

New Enterprises, Installations of New Machinery, Development of Mines and Transfers of Property Reported by Special Correspondents

THE CURRENT HISTORY OF MINING

Alabama

JEFFERSON COUNTY

Tennessee Coal, Iron and Railroad Company—Four of the open-hearth steel furnaces at Ensley have been started, and the rail mill has also been put in operation. There is sufficient pig iron on hand to run the furnaces for three or four weeks. Two blast furnaces are ready and will be blown in before that time if conditions warrant.

Williamson Iron Company—The blast furnace at Birmingham has blown out for repairs. It is a small furnace.

Arizona

COCHISE COUNTY

Tombstone Consolidated—The shaft is flooded as a result of an accident to the boilers. The management expects to control the water within a few days. It is reported that a duplicate set of pumps will be installed.

Denn-Arizona—Ore has been encountered on the 1250-ft. level. It is native copper in limestone.

Bisbee Coalition—The Bisbee Coalition Mining Company has been organized to absorb the North Bisbee Development Company, by buying the North Bisbee stock at the rate of one share of Coalition for one share of North Bisbee. The new company is capitalized at 1,000,000 shares at \$2 each, and it has been arranged that 150,000 shares are to be sold on the New York market at par.

GILA COUNTY

Miami—About 13,500,000 tons of ore have been developed since the beginning of actual work. A large body of ore is now being blocked out above the 370-ft. level preparatory to mining.

GRAHAM COUNTY

Arizona Copper—The output for the month of May was 2,854,000 lb. of copper.

Shannon—The May production of copper was 1,556,000, lb. being an increase of 98,000 lb. for the corresponding month last year. The total for five months this year is 7,988,000 pounds.

MARICOPA COUNTY

Vulture—At the annual meeting of stockholders of the Vulture Mines Company, the entire board of directors was re-elected as follows: Frank P. Estabrook, Joseph B. Locke, I. M. Taylor, Frederick W. Rockwell, Edward T. Frisbie, Robert Mackay and J. Winslow Pierce.

PINAL COUNTY

Gila Copper—Authorized capital stock, 1,000,000 shares; outstanding, 550,000 shares; treasury, 450,000; par value, \$10. Of the treasury stock 55,000 shares have been offered to the present stockholders at \$2.50 per share, most of which has been taken. Cash in treasury \$75,000; no debts. The property has been developed by 3000 ft. of underground workings, and 6350 ft. of churn drilling. S. W. Mudd is chairman of the executive committee, and Philip Wiseman is manager. The property is seven miles from Kelvin.

California

ALAMEDA COUNTY

American Magnesite—A large gasoline-engine truck has been provided for hauling magnesite from the mines at Red Mountain to Livermore, for shipment to the Cummings factory at San Leandro.

BUTTE COUNTY

Gold Bank—Henry Descant, of San Francisco, has bonded the Gold Bank and Gold Queen quartz mines, at Forbestown, and will work them through the Gold Bank tunnel.

Indiana Gold Dredging—The dredge, wrecked during high waters of last winter, has been righted and pumped out and the machinery repaired.

Steifer—Litigation over this property having ended, construction and development will begin at once.

KERN COUNTY

Desert—Several strong veins have been opened, and it is expected that a 20-stamp mill will soon be erected. M. J. Monette, of Goldfield, Nev., and several Los Angeles people are owners.

Soledad—Litigation has been settled and the mine is now producing ore.

Queen Esther—This company, at Mohave, has bonded the Double Standard mine and good ore is being taken out.

MONO COUNTY

Golden Gate—Jos. A. Brown has sold this property to Mr. Edwards and associates of Bridgeport, \$40,000 to be paid July 4 for working purposes.

NEVADA COUNTY

Lecompton—This mine, at Nevada City, is almost unwatered. The bottom of the 630-ft. shaft has been nearly reached.

Last of the Mohicans—James Morrison has purchased the controlling interest in

this Grass valley mine from A. and George Atterbury.

Ridge Tunnel—Williamson & Cole have discovered a rich ore shoot. The mine is near Washington.

Allison Ranch—This old and once productive mine may be again reopened, being under examination by Goldfield, Nev., men.

Pittsburg—Joseph Weisbein, president, is putting up an extensive surface plant. As soon as the water is all out, 10 machine drills will be put at work. Mark B. Kerr, Nevada City, is general manager.

PLUMAS COUNTY

California-Nevada Consolidated—A 6-ft. vein has been found. Anthony Lowe, of Prattville, is manager.

SAN BENITO COUNTY

Gold—Daniel Burg, of Pinoche valley, has discovered a ledge of gold-bearing quartz in that section. A small amount of silver is with the gold.

SAN BERNARDINO COUNTY

San Bernardino Borax Company—S. Riddel, James M. Kane and Isaac N. Thorne, of San Francisco, and J. W. Searles and Charles Gressard, of San Bernardino, have formed this company to mine for borax.

Borax Consolidated Company—This company has recently completed a borax-refining plant at Otis.

Colorado

BOULDER COUNTY

Alton Tunnel—Manager J. Burke, of Cardinal, Colo., announces that the company intends building a concentrating plant during the year.

London Gold and Copper—Kansas people are interested in this organization, to operate the London and the London Extension mines, near Gold lake, east of Ward, and a 250-ft. tunnel contract has been let.

CLEAR CREEK COUNTY

Atlantic and Daily Districts—E. M. Moscript and associates, of Idaho Springs, are building a mill to handle their own and custom ores from these districts. It is stated that the Atlantic Mining and Milling Company contemplates driving a 5000-ft. adit. C. B. Ireland, Georgetown, Colo., is manager. Ore has been opened in the Coffin mine on Young mountain.

It carries gold, silver and lead, and is of smelting grade.

Vidler Tunnel—Work is to be resumed on the big bore as soon as the electric line for the operation of the compressor plant is finished. The tunnel is in 4300 ft., and about 2200 ft. farther will connect with the tunnel from the western side, near Argentine.

Dives-Pelican—Louisville people interested in these mines at Silver Plume have appointed J. H. Robeson as manager, and active developments will be carried out under him.

GILPIN COUNTY

Gilpin-Boulder Consolidated—A gasolene hoisting plant is being installed, an addition being built to the shaft building, and arrangements made for sinking the Poole shaft several hundred feet deeper; machine drills and compressor may be installed. W. H. Crabtree, Central City, Colo., is superintendent.

Argosy—Denver and Philadelphia people, interested in the Maud S. mine of this company in the Russell district, will install machinery and erect a new shaft building. Joseph Hesselbine, Central City, Colo., manager.

Union Glanders—George S. Petteway, of Florida, has taken a four years' lease and bond on this property in Russell and Lower Fall River districts.

Medora—Arrangements have been made with the Penobscot company to drive a lateral from its tunnel, and more equipment is to be installed by Manager J. W. Koons, Rollinsville, Colorado.

Free Gold—F. A. Burnell, of Denver, has opened up a 5-ft. vein of milling ore, and will treat the same at the Daisy mill, which he has leased. Machinery is to be installed at the shaft, and a new engine and boiler has been installed in the Daisy mill. J. Bechtold, Rollinsville, Colo., is superintendent.

Town Topics—A *lis pendens* has been brought in the Circuit court asking that the sale of the East Notaway property of this company by public trustee to Rufus J. Foster for \$24,272 to be declared null and void; also asking for a receivership during the proceedings. Eastern stockholders are the applicants.

Perigo—Smelting ore is being shipped to the sampling works and mill concentrates are also being regularly produced. D. C. Earl, Rollinsville, Colo., is superintendent.

LAKE COUNTY

Progressive—The Cady Mining Company has leased this property on North Fryer hill to Al. Gans and associates. The shaft will be repaired and new machinery installed, including heavier pumps. The shaft is 300 ft. deep, and from this point exploration will be carried on by drifting. The work is in charge of C. W. Rogers.

Castle View—An output of 25 tons daily is being sent from this Carbonate hill property to the local smelter. Preparations are being made to operate the Evelyn, Giant, etc., from the Castle View shaft, these claims being under lease to the same people.

Lou Dillon—The tunnel started a few months ago is now in 200 ft., and the breast shows several streaks of lead ore. A shaft is also being sunk farther south.

Tribune—The vein of gold ore recently discovered on this property has been drifted on for a distance of about 40 ft., and a shipment will soon be sent to the smelter.

Jennie June—With the disappearance of snow in the Tennessee district this mine will resume active operations. Work is to be carried on at the 250-ft. level, from which high-grade gold ore was obtained last season.

Yak Tunnel—The breast of the main tunnel is now nearly opposite the New Monarch shaft and is nearing the 4-mile mark. Good progress is being made in driving the lateral to the Resurrection No. 1 property.

Sunday Tunnel—Shipments are being sent regularly from this property to the local smelter, the output being about 30 tons daily.

ROUTT COUNTY

Snake River Consolidated—This company is reported to have opened up milling ores in its property, near Three Forks, and is considering the erection of a mill. Lewis A. Pease, Steamboat Springs, Colo., is manager.

Idaho

SHOSHONE COUNTY

Standard—A large body of rich ore was encountered recently on the 1650-ft. level. It is reported as being better than on the upper levels.

Skookum—W. M. Bacon has been given judgment in the District court against Kennedy Hanley and his wife for \$49,659 with costs and interest amounting to \$51,856. In the Superior court of Spokane county, Wash., Aug. 24, 1908, suit was instituted against Mr. Hanley and judgment of \$55,695 granted against him in March, 1909. Of this sum \$6000 is alleged to have been paid. The defendants are owners of property in Shoshone county, including one-eighth interest in the Skookum mining claim. The removal of ore from this claim was the cause of the suit.

Indiana

Hudson Mine Company—The Terre Haute Trust Company has brought suit for the appointment of a receiver for this company, on behalf of Chicago men, who hold \$40,000 in bonds issued by the company when it bought the mine. The new

company had not long been owners when a strike began, which continued for a long time and ultimately involved President Lewis, of the Mine Workers, in a serious controversy with the Indiana officials. The Operators' Association backed up the mineowners in the exacting of fines against idle men under provisions of the yearly agreement. Suits were brought to recover these fines and other wages, and were successful. Other financial difficulties arose and a receivership was decided upon. It is expected that an early adjudication of the company's affairs will be made and perhaps a change in ownership of the mine will also occur.

BLACKFORD COUNTY

More oil wells are being drilled than ever before. In one week recently nine new wells were brought in and two dry holes reported. The seven producers turned out 280 bbl. per day, the heaviest well producing 70 bbl. One heavy-pressure gas well was completed.

GIBSON COUNTY

District Vice-President Rollins, of the miners' union, spent a portion of last week in this county endeavoring to settle differences between local miners and the Princeton Coal Mining Company over the shot-firing question. This question seems to be a difficult one to settle. Formerly the miners employed their own shot-firers. Then the employment of them was turned over to the company, and now, it is said, the men again want to employ their own shot-firers while the company wishes to continue.

VIGO COUNTY

A fire started June 3 in the Fairview mine belonging to the Carlisle Coal Company, a few miles north of Carlisle. The fire is said to have been started by a windy shot.

Kentucky

JOHNSON COUNTY

Consolidation Coal Company—This company is preparing to develop its property in the Miller's Creek coalfield. A large mining plant will be installed, mines opened and a railroad built to connect with the Chesapeake & Ohio. The new work is under charge of L. L. Malone, of Fairmont, W. Va., as manager.

Louisiana

The production of petroleum in May was 265,230 bbl., an increase of 866 bbl. over April. The shipments were by rail, 90,652 bbl.; by Butte la Rose pipe-line, 23,973; total, 114,625 bbl., or 103,868 bbl. less than in April. Refinery consumption is estimated at 50,000 bbl.; field consumption at 15,000 bbl. There were 20 wells completed in May, of which 13 were oil producers, 2 gas producers and 5 dry. On May 31 there were 49 wells under the drill.

Michigan**COPPER**

The estimated output of copper for the Lake Superior district during the month of May is 19,917,500 lb., as compared with 19,675,500 lb. for May, 1907. The total for first five months of this year is 95,342,800 pounds.

Calumet & Hecla—About July 1, the offices of all the subsidiary companies will be transferred to the main office at Ashburton Place, Boston. The transfer will include the Osceola, Tamarack, Ahmeek, Isle Royale, Seneca and Larium, the offices of which have been in the Sears building. The offices of the Centennial and Allouez will be transferred from State street to Ashburton Place, also. It is reported that the office forces of these companies will be retained.

North Lake—This company has encountered ore in its No. 3 drill hole at a depth of about 1800 ft., which is the approximated position of the Lake lode.

New Baltic Exploration—No. 2 drill hole has been started to the west of the first one. No. 1 hole was put down vertically to tap the various formations opened by the trench; but, evidently due to a faulting of the formation, the expected results were not revealed.

Mass—The first mill run on the new lode has been completed. The rock came from the opening of the drifts at the 17th level and consisted of about 600 tons, which yielded about 20 lb. mineral to the ton.

IRON—MARQUETTE RANGE

Empire—This mine, in the Cascade district, is being actively worked and the force has recently been increased. It is owned by M. A. Hanna & Co., of Cleveland.

Empire—Oglebay, Norton & Co. have added to the working force, and expect to make good shipments this season.

Volunteer—This property is being tested with diamond drills.

IRON—MENOMINEE RANGE

Crystal Falls District—It is stated that Corrigan, McKinney & Co. are preparing to ship the big stock piles accumulated at the Dunn, Great Western and Tobin mines.

Iron River District—Active exploration work and shaft sinking are going on north of Iron river, on the James, the Konwinsky, the Hector, the Hall and the Barnette tracts.

Montana**BUTTE DISTRICT**

Davis-Daly—The Colorado shaft has reached a depth of 1485 ft. Preparations are now being made to sink to the 2000-ft. level. One hundred men are employed.

BROADWATER COUNTY

Ohio-Keating—At the recent meeting of stockholders the following directors were elected for the ensuing year: R. M. Calkins, W. H. Penfield, C. H. Smith, George M. Bourquin and John F. Cowan. At the directors' meeting held afterward, R. M. Calkins was elected president, and C. H. Smith, secretary and treasurer.

FERGUS COUNTY

West Kendall Gold Mining Company—The company has recently been incorporated by F. J. Robinon, C. A. Drinkard and J. H. Connely. The capitalization is \$1,000,000; par value of shares is \$1 each. The company will develop what is known as the McClure group of claims on the west side of North Mocasim mountain. The ore is free milling.

GALLATIN COUNTY

Washer Copper—The coal washer of the company, situated at Stoors and valued at \$200,000, was recently destroyed by fire, presumably of incendiary origin. Edwin G. Bartel and Dr. J. P. Reins, of Butte, had recently secured a lease on the property from the Washoe company. Previous to that time the plant had been idle for some time.

JEFFERSON COUNTY

Corbin-Clancy Creek Mining Company—The company has recently been organized by Jack O'Neil, D. W. Rodgers and Meyer Gansberger, of Butte. Its capital stock is \$100,000; par value of shares is \$1. The company owns the Ariadana and Bee quartz claims, situated at Gregory gulch, west of the Corbin & Calumet property. Men have recently been put to work cleaning out the 700-ft. tunnel. W. C. Hoskins is in charge of the work.

Nevada**ESMERALDA COUNTY—GOLDFIELD**

Black Butte—The miners have leased the workings opened by the main shaft and are operating the same on a coöperative plan. Small shipments are being made from the property.

Pittsburg-Nevada-Rialto—A consolidation has recently been effected, and last week two shifts were started on the property of the Pittsburg-Nevada, situated on the south slope of Knickerbocker mountain, about three and one-half miles east of Goldfield.

Nevada Eagles—The new shaft is down to a depth of 300 ft. The compressor and hoist, formerly in commission at the old shaft are being moved to the new shaft, which will be sunk to the 500-ft. level.

Yellow Tiger—Work has been closed down on this property for 30 days during which time arrangements are to be made for the resumption of work on a larger scale. Manager Maurice Starne is now in

Denver to attend a meeting of the directors. It is expected that the shaft now 700 ft. deep will be sunk to the 1000-ft. point, at which depth the ledge, encountered in the upper levels, will be thoroughly prospected.

ESMERALDA COUNTY—RAWHIDE

There are 10 mines that can ship ore as soon as the mills are in operation: Grutt Balloon Hill, Mint, Marigold, Grutt Hill Truitt, Dayton Toledo, Prosky No. 1, Rawhide Truitt, Miller, Morning Star, Kerns No. 2 and Kerns No. 1.

Mint Lease—The shaft is down to the 390-ft. level, and in a few days the cross-cut will be commenced on the 400-ft. level. The country rock in the shaft is the same as on the 150-ft. level where rich ore was found.

Grutt Balloon Hill Lease—During the past few days rich ore has been encountered on the 185-ft. level.

Kerns No. 1—This lease has been in litigation for some time, but all matters are adjusted, and the lease returned to its owners, W. B. Weddell and associates, of Ogden, Utah. It is the intention of the owners to push the work and cross-cut to the Prosky No. 1 vein. *

Ellendale—A reported strike has been made 30 miles east of Tonopah in the Salisbury wash. The district is called Ellendale. The ore at the surface runs high in gold.

Golden Arrow—It is the purpose of the leasing company to sink to the 500-ft. level before any crosscutting is commenced. The shaft is now 300 ft. deep. Dr. Gordon is the principal financier of the company. The lease is located on the Rawhide Consolidated property.

Dayton-Toledo—This lease on the Coalition estate is now shipping much ore to the small mills on the flat east of Rawhide. The shaft is now down 300 feet.

Marigold—Shipments from this lease for the last two weeks in May exceeded \$12,000, the ore being taken from the north and south drifts on the 160-ft. level.

Prosky No. 1—An eight-ton shipment was made last week to the Western Ore Purchasing Company at Hazen, the ore coming from the 100-ft. level. The shaft now 100 ft. deep is being sunk to the 150-ft. level.

Victor Lease—General manager I. H. Cook, of Rawhide, is preparing for the installation of a ten-stamp mill. The company claims to have 20,000 tons of \$12 ore blocked out on the 125- and 200-ft. levels.

ESMERALDA COUNTY—WILD HORSE CANON

Rogers Brothers—Work will soon commence on the Wild Horse Cañon property, 22 miles south of Rawhide, owned by the Rogers Brothers, of Chicago. They are now preparing to install a large hoist and compressor on their group of claims.

New York**DUTCHESS COUNTY**

American Cement Company—This company has bought 13 acres of land on the river front at Poughkeepsie for the purpose of building a large portland cement plant. It has also bought a large tract of land near that city, on which there are deposits of limestone.

Oklahoma

In the month of May, according to the reports of the *Oil Investor's Journal*, 284 new wells were completed in the Mid-Continent oil districts; of which 255 were oil producers and 29 were dry. There were 207 new wells in progress at the end of the month.

The production of petroleum in May, as reported by the same authority, was 3,532,596 bbl., or 208,702 bbl. more than in April. The shipments in May were 3,374,896 bbl., leaving 157,700 bbl. to be added to stock. The total stocks reported in Oklahoma on June 1 were 55,303,756 bbl. crude oil.

JOHNSTON COUNTY

Chickasha Mineral, Oil and Silica Company—This company has been formed by the consolidation of the Oswald, Kemp & Lewis Silica and the Lytton Mineral companies. Its object is to develop extensive glass-sand deposits near Tishomingo. T. W. Lytton is president and E. D. Reed, secretary and treasurer.

TULSA COUNTY

Brummett Coal Company—This company at Tulsa is preparing to make improvements to its plant. It will build a switch from the main line of the St. Louis & San Francisco railroad to the mine; it will also install an electric mining plant with a daily capacity of 200 or 300 tons. M. S. Stout, Tulsa, is president.

Oregon**DOUGLAS COUNTY**

A rich deposit of copper ore containing some gold is reported to have been found recently about eight miles south of Roseburg. The mineral outcrops at the surface a distance of 600 ft. and the vein is from 50 to 60 ft. wide.

LANE COUNTY

Nicodemus Mining Company—This is a newly organized company that has acquired the Star Consolidated Mining Company of Bohemia, with a capitalization of \$20,000. One-half of the stock has been sold at par, and the balance will be sold from time to time as money is needed for development work. The officers are Dr. R. G. Black, president; H. G. Colton, vice-president; Charles H. Thompson, secretary and treasurer. All are Portland men.

Twin Rocks—Development work has been resumed. The long cross-cut tunnel

will be completed to the ledge, and then the management plans to install a plant. Louis Hartley, of Bohemia, Ore., is manager.

South Dakota**LAWRENCE COUNTY**

The mining situation in this section of the Black Hills has improved considerably since the flood of last week. Unusually heavy rains continue to render ore shipments uncertain.

Mogul—The mines ship to the mill over the Burlington while repairing the narrow-gage. The mill is operating at three-quarters capacity.

Golden Reward—Operations will be resumed this week. The shut-down was due to the recent flood.

Homestake—Mining was suspended a few days, but the plant is now running at full capacity.

Reliance—The flood carried away the new tailings dam which will prevent resumption for some time as the company has been restrained from discharging tailings into Little Spearfish creek.

Minnesota Mines—A second low-speed Chilean mill has been installed which will increase the milling capacity from 100 to 200 tons per day. In order to provide this increased tonnage, tracks are being laid from two open cuts to the mill and a 12-drill compressor is being installed.

Texas

Oil production in the southeast or coast districts in May was 822,225 bbl., an increase of 59,585 bbl. over April. Shipments by sea were 289,253 bbl.; by rail, 478,871; total, 768,124 bbl., or 171,826 bbl. more than in April. Refinery consumption is estimated at 150,000; field consumption at 60,000 bbl. There were 52 new wells completed in May, of which 36 were oil producers and 16 dry. There were 67 new wells in progress at the end of the month.

Utah**BEAVER COUNTY**

Cedar-Talisman—This property in the North Star district will soon be on the shipping list. It is planned to haul the ore to Milford for shipment to the Salt Lake valley smelters. S. S. Pond, General manager, Beaver, Utah.

JUAB COUNTY

Beck Tunnel—The annual meeting of this company was held in Provo last week, all the old officers, including Jesse Knight, president and general manager, being re-elected. During the year a total footage of 3550 ft. was driven. The report explains the work that is being done to recover the faulted orebody from which \$675,000 in dividends were paid.

Tintic Mines—This company, which was

recently organized to work the Bradley group of 30 claims in northwest Tintic, is making good headway. The company is also working the American Star group, covering the extension of the Grand Central-Mammoth ore-bearing channel. M. F. Shannon, superintendent, Eureka, Utah.

Sioux Consolidated—The new compressor is now in use. It is of five-drill capacity, and will enable the company to do considerable prospecting in addition to handling the usual amount of ore. The orebody has been opened in such a manner that a steady output of about 14 carloads per week is being maintained.

SALT LAKE COUNTY

Columbus Consolidated—The big station pump is ready for operation, and will be put in use whenever required. The management is now drifting east on the 400 level. The aerial tramway while out of commission was replaced by teams, but is again in working order.

Washington**KING COUNTY**

Grand Ridge Coal—After several weeks' preparatory work regular shipments are being made to Seattle. This mine has been idle for a number of years.

SNOHOMISH COUNTY

Nonpareil Consolidated—The second ledge in the crosscut tunnel has been cut, showing 7 ft. of chalcopyrite.

Index Granite Works—This company is now employing 128 men. A tunnel is being run to the lower quarry.

Wisconsin**IRON-GOGBEC RANGE**

Germania—At this mine, formerly the Harmony, Hayes Brothers have resumed work. The mine is being unwatered and the shaft repaired.

ZINC-LEAD DISTRICT

At Platteville all the mills are now in operation, and the improvement in the ore market has brought about the reopening of all the mines in the vicinity. At Benton also there is much activity for the same reason.

Calvert—Madison, Wis., people have bought this mine, which adjoins the Frontier, and is supposed to carry the extension of the rich orebody found in that mine. The new owners will open up the mine and equip it with a mill.

Fox—Another shaft is to be sunk to improve the ventilation. The mine is making a large output, the mill making 33 tons of concentrates daily.

Mills—This mine has been shut down, pending a reorganization of the company.

Vandeventer—The new rotary roaster is in operation and is producing a high-grade of jack. It recently turned out 105 tons of mill concentrates from 345 tons of rock, a result of over 30 per cent.

Canada

BRITISH COLUMBIA—EAST KOOTENAY

Hosmer Mines, Ltd.—The main entry (a cross-cut tunnel) of the Hosmer coal mine, Crow's Nest Pass, is in about 4250 ft., in which distance it has intersected nine seams of coal. Its total section is 22 ft. by 7 ft. 6 in., and it is divided into three compartments—two haulage-ways and a man-way. The present equipment of the colliery is for an output up to 2000 tons of coal a day.

Corbin Coal Mines, Ltd.—This company is opening a coal mine up the south fork of Michel creek, 13 miles from McGillivray station on the Crow's Nest Pass branch.

ONTARIO—COBALT

Ore Shipments—Shipments of ore from Cobalt for the week ended June 5 were: Coniagas, 126,410 lb.; Crown Reserve, 120,613; Cobalt Central, 59,650; Kerr Lake, 62,125; La Rose, 239,128; McKinley-Darragh, 59,460; Nipissing, 325,715; Silver Queen, 127,470; Temiskaming, 60,000; Tretheway, 127,000; total, 1,307,571 pounds.

Chambers-Ferland—The statement presented at the annual meeting on June 9 showed cash in bank, \$54,799; value of ore in transit and at smelters, \$21,544; value of ore on hand, \$15,257. The active liabilities were \$14,324 in all.

Kerr Lake—The output for May is reported at 200,000 oz. silver. The main drift on No. 7 vein on the 150-ft. level was run for 72 ft. on a continuous pay streak, averaging 10 in. in width of high-grade ore. A new vein showing good silver contents has been struck by trenching on the east side of the property.

O'Brien—A vein found some time since on the surface near No. 16 shaft has recently been tapped underground by a crosscut driven at the 110-ft. level. It is about 7½ in. wide.

Temiskaming & Hudson Bay—At a meeting held at New Liskeard, Ont., June 4, the stockholders voted to increase the capital stock from \$25,000 to \$3,500,000. Of the new stock \$2,500,000 will be distributed to the present shareholders, each of whom will receive \$100 for \$1 of his present holdings. The remaining stock will be used for the erection of a concentrator at the plant on the most northerly lot of the company where the mine is at present, and the development of the south end of the property. The increase of the stock was delayed until the disputes with the government were settled and a patent finally issued for the property.

Trinity Cobalt—An order has been granted by the court in Toronto for the winding up of this company on petition of Henry E. Juening, of Buffalo, a creditor for \$8489. The company was incorporated in May last, with nominal

capital of \$100,000. The company is located at Haileybury.

ONTARIO—GOWGANDA

Bartlett—The first shipment of ore consisting of 3000 lb. of high-grade has been made by canoe over the water route to Latchford. The compressor plant is ready for operation.

ONTARIO—SOUTH LORRAIN

Wettlanfer—Frank Loring, consulting engineer, states that \$15,000 worth of silver ore has been taken out of the shaft, which is now 60 ft. down, the showing of silver increasing with depth. A five-drill compressor with two 60-h.p. boilers is in course of installation. Thirty men are at work under Superintendent A. C. Bailey.

ONTARIO—WELLAND DISTRICT

Provincial Gas Company—The attempts to obtain gas or oil in the marsh south of Welland, at a cost of about \$25,000, have resulted in failure. The latest venture was a well which was put down to a depth of over 3000 ft., without results.

QUEBEC

Amalgamated Asbestos Corporation—At the organization meeting held in Montreal, May 26, E. B. Greenshields was elected president; Hon. Robert Mackay, first vice-president; H. E. Mitchell, second vice-president; R. H. Martin, general manager. Offices have been taken in the Eastern Township Bank building, Montreal. The various properties purchased were transferred on June 1 to the new company.

YUKON TERRITORY

The complaint that the freight rates on the White Pass & Yukon railway are excessive, preferred by the Dawson Board of Trade, was brought before the Canadian Railway Commission at Ottawa, June 9. F. T. Congdon, M. P. for the Yukon, represented the complainants. He contended that the present freight rates were so high that they were absolutely prohibitive to the exportation of ore, and that, if they were lowered an enormous trade would be developed. The railway, he said, had been represented as costing \$8,300,000, whereas the actual cost was \$5,000,000, which was excessive for 120 miles. The books of the construction company, he charged, had been purposely destroyed. F. H. Chrysler appeared for the railway. The case was continued.

Yukon Gold—The ditch is now being operated at half capacity. An extension of 10 miles will be made this summer to Gold hill, and the entire line, 70 miles long, will be completed and in operation for mining work next spring. The first work done with this water has been in Lovett gulch. Seven large electric dredges are in operation.

Mexico

CHIHUAHUA

Dolores—The last monthly shipment consisted of 52 bars gold-silver bullion valued at 105,000 pesos.

International Gold Mines Company—It is planned to increase the output as well as the scope of development operations. Shipments of high-grade concentrates are being made. J. H. Pender is manager.

La Fortuna—Shipments of high-grade silver ore are being made from this company's Santa Maria mine in the Neuva Casas Grandes section in the northern part of the state.

San Toy—The work of building a new steel tram terminal station, replacing the wooden structure lately burned down, is now under way, and on its completion the output will be increased.

Yoquivo—High-grade gold ore is being sent out in carload lots from this mine in the Rayon district. The present working force is about 150 men. Qualey Brothers, of New York and Chihuahua, are the owners and operators.

Africa

TRANSVAAL

Gold production in the Transvaal in May is reported at 634,498 oz. fine, being 17,397 oz. more than in April. For the five months ended May 31 the total was 2,824,984 oz. in 1908, and 3,019,430 oz.—or \$62,411,618—in 1909; an increase of 194,446 oz., or \$4,019,200, this year.

Asia

INDIA—MYSORE

Kolar Goldfield—Gold production in May was 46,514 oz. bullion, being 386 oz. more than in April. For the five months ended May 31 the total was 226,114 oz. bullion in 1908, and 227,650 oz. in 1909; an increase of 1536 oz. The bullion reported this year was equal to \$4,234,973, or 204,885 oz. fine gold. The report includes two mines outside of the Kolar district proper—the Hutti Nizam and the Dharwar reefs, in the Deccan.

Australia

NEW SOUTH WALES

Gold production in May was 13,041 oz. fine; for the five months ended May 31 the total was 90,153 oz., or \$1,863,467 in value.

WESTERN AUSTRALIA

Gold production in May is reported by the Chamber of Mines at 129,409 oz., being 8355 oz. less than in April. For the five months ended May 31 the total was 690,311 oz. in 1908, and 649,550 oz.—or \$13,426,200—in 1909; a decrease of 40,761 oz. this year.

New Zealand

Gold exports in May are reported by cable at 45,017 oz. bullion in 1908, and 46,525 oz. in 1909; an increase of 1508 oz. The bullion reported this year was equal to \$901,650, or 43,622 oz. fine gold. Exports of silver for the month were 164,635 oz. in 1908, and 175,958 oz. in 1909; an increase of 11,323 oz. this year.

Metal, Mineral, Coal and Stock Markets

Current Prices, Market Conditions and Commercial Statistics of the Metals, Minerals and Mining Stocks

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, June 16—Little change in condition is to be reported this week. In the West the coal trade is improving slowly. Comparisons from week to week do not show very much change, but there is a great improvement over the corresponding date last year.

Very much the same conditions prevail in the Eastern bituminous trade. The business gains slowly, but still shows a marked advance over a year ago, which is reflected in heavier shipments from mines.

The anthracite trade is quiet and even, with no special feature, and few changes from week to week.

The injunction asked for against the proposed differential rates on West Virginia coal to Lake ports having been denied by the United States District Court, an appeal has been taken to the Circuit Court of Appeals by counsel for the Kanawha & Michigan Railroad Company.

The Commodities Clause—The following circular, dated June 1, shows the plan adopted by the Delaware & Hudson Company for complying with the commodities clause of the Interstate law. The Hudson Company is a subsidiary company, which was organized some time ago: "The Hudson Coal Company has this day arranged to purchase the entire present and future output of coal mined by the Delaware & Hudson Company. The Hudson Coal Company takes over and assumes all contracts and obligations incurred by the Delaware & Hudson Company to deliver coal, and is prepared to accept and fill orders for coal from the former patrons of the Delaware & Hudson Company."

It is reported that the Delaware, Lackawanna & Western will transfer its coal properties to a subsidiary coal company, the stock in which will be issued, in some form not yet determined, to the stockholders of the railroad company.

COAL TRAFFIC NOTES

Tonnage originating on Pennsylvania railroad lines east of Pittsburgh and Erie, year to June 5, short tons:

	1908.	1909.	Changes.
Anthracite	2,366,353	2,267,845	D. 98,508
Bituminous	13,781,518	14,913,686	I. 1,132,168
Coke	2,982,808	4,246,565	I. 1,313,757
Total	19,080,679	21,428,096	I. 2,347,417

The total increase for the year to date was 12.3 per cent.

Coastwise shipments of coal from lead-

ing Atlantic ports, four months ended April 30, long tons:

	Anthracite.	Bitum.	Total.	PerCt.
New York....	5,825,046	3,327,239	9,152,285	65.2
Philadelphia	755,976	1,391,440	2,150,416	16.3
Baltimore....	82,327	1,129,428	1,211,655	8.7
Newp't News	.....	956,929	956,929	6.8
Norfolk.....	.....	561,311	561,311	4.0
Total.....	6,666,249	7,366,347	14,032,596	100.0
Total, 1908.	6,208,427	7,167,567	13,375,994	.....

New York includes all the harbor shipping ports. The shipments at all ports include bunker coal for vessels in domestic trade. Total increase this year, 656,602 tons, or 4.9 per cent.

Coal tonnage passing through the Sault Ste. Marie canals, season to June 1, short tons:

	1908.	1909.	Changes.
Anthracite.....	145,061	260,060	I. 114,999
Bituminous....	208,068	836,800	I. 628,732
Total.....	353,149	1,096,860	I. 743,711

The May shipments this year were heavier than had been expected. In 1908 the coal movement did not fairly begin until June.

New York

ANTHRACITE

June 16—The anthracite trade remains steady and without any special incident. May shipments showed a falling off from previous months in the year, but that was generally expected.

There is no change in prices. We quote for prepared sizes, \$4.45 for lump, and \$4.70 for egg, stove and chestnut, all f.o.b. New York harbor. For steam sizes current quotations are unchanged at \$3.10@3.25 for pea, \$2.35@2.50 for buckwheat, \$1.70@2 for rice or buckwheat No. 2, and \$1.25@1.50 for barley, f.o.b. New York harbor points.

BITUMINOUS

Consumers are evidently beginning to take more interest in the market, although they stir themselves rather more slowly than dealers would like to see. It is not to be denied that commercial trade is better, though it can hardly be called brisk as yet. All-rail trade continues the best. New York harbor prices are unchanged, lower grades selling at \$2.40@2.50, f.o.b. harbor shipping port, and better grades for \$2.60 and upward. Transportation is rather slow, but car supply is good.

In the Coastwise trade vessels are in good supply and freights continue low. For large vessels from Philadelphia rates are 75@80c. to Lynn and Newburyport; 60@65c. to Boston, Saco and Portland;

45@50c. to Providence and the Sound. From New York rates are 60@65c. to points around Cape Cod.

A subject of considerable interest and discussion in the trade is the present coal situation in England. The latest advices are that settlements appear impossible in Wales and in the Scotch districts, and it is very probable that there will be an extensive strike. In case this occurs a considerable business will be done here in export coal; not so much to England directly as to South America and other countries which are now supplied by English coal. Dealers here are looking out for this contingency.

Birmingham

June 14—An improved condition is reported in the coal market. The mines in Alabama are beginning to receive orders that warrant more activity in the operation.

State Mine Inspector Edward Flynn announces that 56 men have lost their lives by accident in coal mines in this State so far this year.

Considerable attention was attracted to the annual convention of District No. 20, United Mine Workers of America, this week in Birmingham. The organization is practically dead; the attendance at the convention not being large enough to warrant the renting of a hall, the meeting was held in the offices of the organization.

Chicago

June 14—Conditions in the coal market are somewhat better for the seller, owing to restricted shipments of the chief supply, Illinois and Indiana fine coals. The ordinary consumer is buying closely, evidently in the expectation that inactivity will force prices down to their lowest point for the year soon. Lump coal is especially inactive, and in some cases brings 15 or 20c. less than standard prices through demurrage sales. Domestic trade is practically at a standstill in bituminous and very sluggish in anthracite.

Illinois and Indiana coals bring, in car lots, \$1.75@2.25 for lump, \$1.65@1.75 for run-of-mine and \$1.40@1.70 for screenings.

Eastern coals share the general condition, the market being light but shipments lessened so that prices are fairly firm. Hocking, which has been in too large supply for several weeks, is somewhat improved as regards the amount on the

market, but receipts are irregular, and occasionally a consignment is sold at 10 or 20c. below the \$3@3.15 otherwise obtained. Youghiogeny is in light but steady movement at \$3.15 for ¾-in. gas, and Pittsburg No. 8 in ¾-in. brings \$2.65.

Anthracite sales are particularly light owing to the June advance of 10c., which is expected to defer most of the buying for the month to its latter end.

Cleveland

June 15—Lake trade is still rather slow, and the demand in the Northwest is not yet such as to indicate a pressing call for coal. Only contract boats are in commission.

Local trade is improving slowly, and there are indications of good demand for steam coal. Prices show little change. Slack is in best demand. Middle district coal brings \$1.90@2 for lump; \$1.65@1.75 for run-of-mine; \$1.25@1.35 for slack. No. 8 district brings about 5c. more, except for slack, which is \$1.40 firm.

Pittsburg

June 15—Between 8,000,000 and 9,000,000 bu. coal have been shipped down the river in the past week, pretty well cleaning out the accumulation in the pools and harbor. There are plenty of empties at the tipples and the railroad mines will continue in steady operation for some time. The market remains rather quiet. Nominal prices are \$1.10 to manufacturers and \$1.20 to retail dealers, for mine-run at mines, these prices being shaded 5 to 10c. Slack is quoted at 60@65c. per ton.

Connellsville Coke—The appraisalment of properties expected to be taken into the coke merger continues. The latest information is that while a merger will likely be put through, it will hardly comprise as large a portion of the independent coal acreage and coking capacity as the promoters have lately claimed. A number of important independents in the Connellsville and lower Connellsville fields are known positively as refusing to go in, while the merger will probably involve a larger acreage in Greene county, West Virginia and other fields than has been admitted. Some Connellsville interests, it is alleged, have put in their Connellsville holdings at moderate prices but have asked considerably above market values for outside holdings, and stipulate that all or none must be taken.

Prices remain at \$1.50@1.60 for prompt Connellsville furnace coke, contract coke being \$1.60@1.75; Connellsville foundry coke remains at \$1.80@2 for prompt and \$1.90@2.25 for contract.

The *Courier* reports the production in the Connellsville regions, week ended June 5, at 291,686 tons, an increase of 7000 tons; shipments at 3667 cars to Pittsburg district, 5734 cars to points west and 783 cars to points east of Connellsville; a total of 10,184 cars, a gain of 200 cars.

Foreign Coal Trade

United States Coal Exports—Exports of coal from the United States—heretofore reported—to which is now added coal supplied to steamships in foreign trade, four months ended April 30, long tons:

	1908.	1909.	Changes.
Exports.....	3,053,204	2,772,046	D. 281,158
Bunker coal.....	1,985,706	1,907,307	D. 78,399
Total.....	5,038,910	4,679,353	D. 359,557

Total decrease in coal sold for consumption beyond the limits of the United States this year was 7.1 per cent.

Austrian Coal Production—Coal production of Austria-Hungary, four months ended April 30, metric tons:

	1908.	1909.	Changes.
Coal.....	4,797,563	4,652,297	D. 145,266
Brown coal.....	9,325,169	8,497,733	D. 827,436
Total mined...	14,122,732	13,150,030	D. 972,702
Coke made.....	627,188	600,686	D. 26,522
Briquets made...	48,569	60,506	I. 11,937

The greater part of the briquets is made from brown coal, or lignite.

Spanish Imports—Imports of coal into Spain, two months ended Feb. 28 were 354,115 metric tons, an increase of 42,138 tons. Imports of coke 40,199 tons, an increase of 2400 tons.

Welsh Coal Prices—Messrs. Hull, Blyth & Co., London and Cardiff, report current prices of coal as follows, on June 5: Best Welsh steam, \$4.02; seconds, \$3.84; thirds, \$3.60; dry coals, \$3.84; best Monmouthshire, \$3.48; seconds, \$3.36; best small steam, \$2.64; seconds, \$2.46. All per long ton, f.o.b. shipping port.

Iron Trade Review

New York, June 16—The iron and steel markets continue generally strong and active. A tendency to advance prices has been apparent in some lines, but no positive action in that direction has been taken.

In pig iron business has been more active and many inquiries have been received in addition to the sales made. Foundry iron is in fair demand, but the greatest activity has been in basic pig. The size of the lots sold shows some increase and orders are being placed farther ahead. Prices are firm as a rule, no general advance being made, but sellers are not making concessions, especially on future deliveries. The increased capacity of the furnaces in blast is a prominent feature in the situation, but does not seem to affect the market at all unfavorably.

In finished material building and bridge work continue to make an active demand for structural material. Sales of wire and wire products are rather smaller, but this appears to result from the fact that jobbers and dealers generally are well supplied, rather than from any diminution in demand. The same thing is the case with bars, but it is noted that store and jobbing trade is generally improving. In rails quite a number of small orders have been

placed for standard sections, but no large contracts are reported. Trolley rails and light rails show a considerable business.

Pig Iron Production—The statistics of the blast furnaces, as collected by the *Iron Age* show that on June 1 there were 233 coke and anthracite furnaces in blast, having an aggregate weekly capacity of 442,500 tons. This is 30,500 tons more than on May 1, and is the highest capacity reported since Nov. 1, 1907. The recent increase in furnaces in blast has been entirely in the steel-works furnaces; the merchant furnaces show no increase since December last. Making allowance for the charcoal furnaces, the estimated make of pig iron in May was 1,897,000 tons; for the five months ended May 31, it was 9,079,000 tons.

Lake Superior Iron Ore—Shipments of iron ore from the Lake Superior region for the season to June 1 are reported by the *Cleveland Iron Trade Review* as below, in long tons:

Port.	1908.	1909.	Changes.
Escanaba.....	16,245	384,856	I. 368,611
Marquette.....	.....	133,097	I. 133,097
Ashland.....	21,128	240,855	I. 219,727
Superior.....	132,818	608,515	I. 475,697
Duluth.....	86,691	1,215,925	I. 1,129,234
Two Harbors....	28,433	725,820	I. 697,387
Total.....	285,315	3,309,068	I. 3,023,753

Last year no considerable shipments were made before June. As compared with 1907, the shipments this year show a decrease of 2,943,193 tons.

Baltimore

June 14—Exports for the week included 1,317,352 lb. scrap tin to Rotterdam. Imports included 1309 tons ferromanganese and 9 casks silico-spiegel from Liverpool; 5400 tons iron ore from Cuba.

Birmingham

June 14—General conditions in the Southern territory have changed for the better. There is a better demand for pig iron, prices have begun to strengthen and plants are beginning to resume operations. No. 2 foundry iron is being quoted at \$11.50 per ton, minimum, for delivery during June and July, with \$12 for third-quarter delivery. Some iron has been sold already in this section above \$12 per ton, delivery during the fourth quarter. Inquiries are being received.

Four of the open-hearth furnaces at the steel plant at Ensley were started up during the past week. An order for 12,000 tons of rails has been received. Announcement is made that the reorganized company taking over the properties of the Southern Steel Company—of which W. H. Hassinger, of Birmingham, is president—has \$1,500,000 necessary for working capital underwritten and the work of preparing the plants for operation will be begun.

Chicago

June 14—The iron market remains but slightly better than a week ago as regards

sales of pig iron, although inquiries are more numerous, sales of finished materials increasing and confidence more and more apparent. Consumers, to a large extent, are supplied for the third quarter; for the fourth quarter they are buying both Northern and Southern pig iron in lots from a carload up to 500 tons. Large requirements are being figured on in malleable iron. Prices remain firm at \$11.50 @12 Birmingham (\$15.85@16.35 Chicago) for Southern and \$16.50@17 for Northern, for third and fourth quarters. Some sales are made at 25 or 50c. above or below these prices, but not many. The selling interests are apparently firm.

In structural material the market continues active and railroad supplies also are in good demand. Coke is fairly active at \$4.70 (\$2.05 at ovens) and with the supply large.

Cleveland

June 15—Some sales of iron ore are reported still, but transactions have not been heavy, so far as can be ascertained. Arrivals for May at Lake ports were much larger than last year.

The breaking down of the lock gates in the Canadian canal at the Sault Ste. Marie on June 8, by a steamer running into the gates, will put the Canadian canal out of commission for some time. It does not, of course, affect the American canal, which will be able to pass all the vessels coming, but will be crowded with traffic as the season goes on. In busy times the Canadian canal carries about 20 per cent. of the traffic.

Pig Iron—No large transactions are noted, but many small sales, 500-ton lots and under. Sellers are firmer in their views, and are holding on a basis of \$15.25@15.50 for No. 2 foundry, Cleveland.

Finished Material—A good business has been done in bars and structural steel with a fair lot of plates. Structural shapes are quoted at 1.30@1.35c.; steel bars, 1.20@1.25c., Pittsburg basis.

Philadelphia

June 16—The pig-iron market is somewhat quieter but a good deal of business is being done and prices are firm, with many furnaces holding for a little higher range on fourth quarter. A good tonnage of basic has been sold and pipe foundries are taking much iron, principally low-grade Southern. No. 2X foundry may be quoted \$16.50 for prompt and \$16.75 for third quarter. Basic is about \$15.50 per ton in this territory.

Steel Billets—Sales are fair with a good deal of inquiry. Prices are unchanged.

Bars—Business continues fair, demand being mostly for refined iron which sells in this territory at around 1.40c. while 1.35c. is asked for steel bars. Store trade is good.

Plates—Sales of boiler and ship plates are reported good.

Structural Material—No large contract is reported this week but a good total of small sales. There is talk of increased prices, but it has not materialized so far.

Scrap—Demand and prices are going up. Dealers are sitting on their piles, afraid to let it go in view of the higher quotations promised. The biggest call is for heavy steel melting scrap, for which \$15.50@16 has been realized. Good casting is also in demand.

Pittsburg

June 15—While general buying of iron and steel products is not as heavy as during the recent rush, it is still of fair volume and the buying is amply sufficient to maintain the bullish feeling which has pervaded the trade. Bars, plates, shapes and wire products have been advanced slightly in the past few weeks. Shapes are fairly well held at 1.30c., Pittsburg, and plates at 1.25c., although occasionally these prices are shaded \$1 a ton.

In the past few weeks the railroads have been better buyers, but they are still far short of the average of 1906 and 1907. Other consumers are taking as large tonnages as ever, and the only question is as to the permanence of the movement. It is known that a portion of the material now being shipped from mills is going into stocks, but it is believed that the rate of consumption will increase.

Pig Iron—Prices in the local market have advanced again, by fully 25c. The Standard Sanitary Manufacturing Company late last week bought 5000 tons, for third-quarter delivery, divided among No. 2 foundry at \$14.50, Valley, No. 3 foundry at \$14, Valley, and gray forge at \$13.75, Valley. These prices could not be duplicated now. Gray forge has since sold at \$14.15, Valley, while No. 2 foundry is held at a minimum of \$14.75, Valley. Early last week sales of standard basic were made at \$14.25, Valley, but a couple of days later \$14.50 was paid for basic somewhat off in analysis, and the minimum of the market is \$14.75, which price has been done on third quarter, with \$15 and higher asked for fourth quarter. The Republic Iron and Steel Company has just bought 5000 tons of standard bessemer, following its recent operations by which it bought 10,000 tons and borrowed some 20,000 tons. Standard bessemer is at a minimum of \$15.25, Valley, most sellers asking \$15.50.

Steel—The market on sheet-bars is firmer since the sales in the past few weeks at cut prices, and \$25@25.50, delivered in the district, appears to be the best that can be done, while some mills are quoting \$26 on prompt delivery. Bessemer billets are firm at \$23, Pittsburg, while open-hearth billets are scarce and a premium of \$1 per ton is being asked.

Sheets—Demand has improved slightly and mill operations have increased, the leading interest operating about 70 per cent. of its capacity, while the independents are doing 75 per cent., or better. The Amalgamated Association is holding a "delegate convention" in Pittsburg this week anent the declaration of the American Sheet and Tin Plate Company that after June 30 it will operate all its mills on the open-shop plan. The men will probably try to close the hitherto union plants of the leading interest. This would have little effect in the sheet branch, but would be a serious matter in tinplate. The sheet market remains at 2.20c. for black and 3.2c. for galvanized, 28-gage, these prices being occasionally shaded \$1 per ton. The open quotations on corrugated roofing are \$1.55 for painted and \$2.80 for galvanized, 28-gage, per square, but these prices are being shaded \$1 or \$2 per ton.

Ferromanganese—The market continues quiet. The regular quotation is \$40.50@41, Baltimore, equal to \$42.45@42.95, Pittsburg, but the lower price might be shaded 50 cents.

Foreign Iron

German Iron Trade—Exports and imports of iron and steel in Germany, four months ended April 30, metric tons:

	Exports.	Imports.	Excess.
Iron and steel....	1,225,903	128,038	Exp. 1,097,024
Machinery.....	97,309	19,765	Exp. 77,544
Total.....	1,322,371	147,603	Exp. 1,174,768
Total, 1908.....	1,275,657	212,342	Exp. 1,063,315

Imports of iron ore this year, 2,364,201 tons; exports, 898,442 tons. Imports of manganese ore, 100,820; exports, 794 tons.

British Iron Ore Imports—Imports of iron ore into Great Britain, four months ended April 30, were 1,890,279 long tons in 1908, and 1,850,677 in 1909; decrease, 39,602 tons. Of the imports this year 1,416,557 tons were from Spain.

Metal Markets

New York, June 16—The metal markets continue generally strong, but hardly as active as recently. A good demand for consumption is generally apparent.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal.	Exports.	Imports.	Excess.
Gold:			
May 1909..	\$11,171,265	\$ 2,263,721	Exp. \$ 8,907,544
" 1908..	26,555,913	3,101,002	Exp. 23,454,911
Year 1909..	55,487,891	17,767,857	Exp. 37,720,034
" 1908..	44,891,257	22,958,223	Exp. 21,933,034
Silver:			
May 1909..	4,428,448	3,857,388	Exp. 571,060
" 1908..	4,028,334	3,389,568	" 638,766
Year 1909..	28,854,629	18,532,453	" 5,322,176
" 1908..	21,077,185	17,688,150	" 3,389,035

Exports from the port of New York, week ended June 12: Gold, \$282,550, chiefly to Buenos Aires; silver, \$929,6238, to London and Paris. Imports: Gold, \$101,631, chiefly from South America and Australia; silver, \$152,076, from the West Indies and Mexico.

Gold and silver movement in France, four months ended April 30:

	Imports.	Exports.	Excess.
Gold... Fr.	208,958,000	F.24,462,000	Imp.Fr.179,496,000
1908...	230,164,000	9,318,000	Imp. 220,846,000
Silver...	52,931,000	41,735,000	Imp. 11,196,000
1908...	45,662,000	54,362,000	Exp. 8,700,000

Imports of copper and nickel coins, 27,000 fr. in 1908, and 26,000 fr. in 1909; exports 305,000 fr. in 1908, and 161,000 fr. this year.

Gold—The price on the open market in London continues unchanged at 77s. 9d. per oz. for bars. There was no special demand, and most of the gold offered was taken by the Bank of England. In New York there were no shipments direct to Europe, but \$2,250,000 were taken for export to Japan on London account.

Platinum—Business is rather quiet, but it is usually in that condition through the summer. Prices are unchanged, dealers quoting \$22.50@23 per oz. for refined platinum, \$25 for hard metal and \$18@20 for good scrap.

Silver—The market has been almost stationary through the week, fluctuations being very narrow.

SILVER AND STERLING EXCHANGE

June.	10	11	12	14	15	16
New York....	52½	52½	52½	52½	52½	52½
London.....	24½	24½	24½	24½	24	24½
Sterling Ex..	4.8775	4.8760	4.8775	4.8760	4.8775	4.8785

New York quotations, cents per ounce troy, fine silver; London, pence per ounce sterling silver, 0.925 fine.

Exports of silver from London to the East, as reported by Messrs. Pixley & Abell, year to June 3:

	1908.	1909.	Changes.
India.....	£ 3,584,018	£2,216,200	D. £1,367,818
China....	516,400	1,075,100	I. 558,700
Straits.....	90,200	82,900	D. 7,400
Total.....	£ 4,190,618	£3,374,100	D. £ 816,518

Receipts for the week, £2500 from Australia, £5800 from the West Indies and £170,400 from New York; total, £178,700. Exports, £1800 to Egypt and £55,000 to India; £56,800 in all.

Copper, Tin, Lead and Zinc

June.	Copper.			Tin.	Lead.		Zinc.
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.		New York, Cts. per lb.	St. Louis, Cts. per lb.	
	13½	13½			4.27½	5.22½	
10	@13½	@13½	60½	30	4.35	@5.25	
	13½	13½			4.27½	5.22½	
11	@13½	@13½	59½	29½	4.35	@5.27½	
	13½	13½			4.27½	5.25	
12	@13½	@13½	....	29½	4.35	@5.30	
	13½	13½			4.27½	5.25	
14	@13½	@13½	59½	29½	4.35	@5.30	
	13½	13½			4.27½	5.25	
15	@13½	@13½	59½	29½	4.35	@5.30	
	13½	13½			4.27½	5.25	
16	@13½	@13½	59	29½	4.35	@5.30	

London quotations are per long ton (2240 lb.) standard copper. The New York quotations for electrolytic copper are for cakes, ingots and wirebars, and represent the bulk of the transactions made with consumers, basis, New York, cash. The price of cathodes is usually 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

Copper—The persistent decline in the London standard market has discouraged buying on the part of consumers, both here and abroad. Sellers have been trying to make a market by offering concessions from day to day, but so far they have met with but little success. The actual business transacted has been of a negligible quantity, the market for Lake in particular being quite nominal. The close is weak at 13½@13½c. for Lake copper; 13½@13½c. for electrolytic copper in ingots, cakes and wirebars. The average of the week for casting copper has been 13@13¼ cents.

Copper sheets are 17c. base for large lots. Full extras are charged, and higher prices for smaller quantities. Copper wire is 15c. base, carload lots at mill.

The liquidation of long holdings and short selling, which did not meet with a proportionate inquiry by new buyers, brought about a rapid and uninterrupted decline in the standard market in London. The statistics published for the half month show an increase in the visible supply of 5400 tons. This news is adequate explanation for the weak closing quotations which are cabled at £59 for spot and £59 17s. 6d. for three months.

For refined and manufactured sorts we quote: English tough, £63; best selected, £62@63; strong sheets, £74@76.

The report of the Copper Producers' Association gives the following figures for May and the five months ended May 31, in pounds:

	May.	Five Months.
Stocks, May 1 and Jan. 1	183,198,073	122,357,266
Production in U. S.	118,356,146	564,825,116
Total supplies.	301,554,219	687,182,382
Deliveries, dom. and exp.	131,706,078	517,334,241
Stocks, June 1.	169,848,141	169,848,141

Production includes copper refined from all sources. Estimated exports for May, 70,387,520 lb.; for five months, 269,613,120 lb.; leaving for domestic deliveries, 61,318,528 and 247,721,121 lb., respectively. Decrease in stocks in May, 13,349,932 lb.; increase in five months, 47,490,875 pounds.

Owing to an error in transcribing, the May average for Lake copper was printed in our last issue at 13.228c. It should have been 13.238c., as given in the table this week.

Exports of copper from New York and Philadelphia for the week were 9968 long tons. Our special correspondent gives the exports from Baltimore at 1824 tons copper.

Stocks of copper in England and France on June 1 are estimated by Henry R. Merton & Co., at 56,854 tons; this including 5850 tons afloat from Chile and Australia. The total is an increase of 5936 tons over the May 1 report.

Tin—The activity in the London market which we reported last week has somewhat subsided. Notwithstanding the reduced transactions, the tone of the market remains steady and the close is cabled at £133 17s. 6d. for spot, and £135 7s. 6d. for three months.

The firmer London market has not had any influence on domestic consumptive buying. Traders also are reluctant in following the advance in London, and business in tin is practically at a standstill. Quotations at the close are 29¼ cents.

Supplies of tin in May, as reported by A. Strauss & Co., were 7734 long tons; deliveries, 6840 tons. The visible stocks June 1 were 19,818 tons, an increase of 894 tons during May.

Exports of tin from the Straits, three months ended March 31 were: United States, 5166; Great Britain, 6722; European Continent, 1360; China and India, 557; total, 13,805 long tons, a decrease of 2235 tons from last year.

Lead—There is a steady business doing in this metal at 4.35c., New York, and 4.27½@4.32½c., St. Louis. Chemical lead has sold at St. Louis at 4.35 cents.

The London market is somewhat lower, and the close is cabled at £13 1s. 3d. for Spanish and £13 3s. 9d. for English.

Spelter—The improvement in this metal has made further progress. Large orders are being placed daily, particularly by the galvanizers. The smelters are reluctant to engage themselves very far ahead, for in addition to the proposed tariff and the advancing ore market in Joplin, they have now to contend with labor difficulties. It is reported that a number of plants in Kansas are on dead fire because they have a strike on their hands on account of refusing the demand of their men for a raise in wages. The smelters are assuredly in a bad way. They are face to face with a scarcity of ores and the price of spelter does not leave sufficient margin as against the current price of ore. The import lists show constant importations of foreign spelter on an increasing scale, which it is understood is being used for drawback purposes. The close is firm at 5.25@5.30c., St. Louis, and 5.40@5.55c., New York.

New York quotations for spelter June 10 were 5.37½@5.40c.; June 11, 5.37½@5.42½c.; June 12 to June 14, inclusive, 5.40@5.45 cents.

The London market is somewhat lower, the close being cabled at £22 for good ordinaries, £22 5s for specials.

Base price of sheet zinc has been advanced 1/4c. to 7c. per lb., f.o.b. La Salle-Peru, less 8 per cent. discount.

Other Metals

Antimony—Sales are only of a retail kind. Prices are nominally unchanged at 8 3/8c. for Cookson's; 7 7/8c. for U. S.; 7 3/8@7 7/8c. for other brands. Business is waiting a decision on the tariff.

Aluminum—No change is reported. No. 1 ingots are 22@24c.; wire, 31@32c. base; sheets, 33@34c. base.

Quicksilver—Business is fair only. New York price is unchanged at \$44.50 per flask of 75 lb. San Francisco, \$44 for domestic and \$42 for export. London, £8 7s. 6d. per flask, with 5s. less done by jobbers.

Nickel—Large lots, contract business, 40@50c. per lb. Retail, spot, from 50c. for 2000-lb. lots up to 55c. for 500-lb. lots. The price for electrolytic is 5c. higher.

Cadmium—Current quotations 75c. per lb., in 100-lb. lots, at Cleveland, Ohio. In Germany, 450@475 marks per 100 kg. at factory.

Magnesium—Quotations for this metal are \$1.25 per lb., New York, in 100-lb. lots; for 5-lb. lots, \$1.40 per pound.

Spanish Metal Exports

Exports of metals and minerals from Spain, two months ended Feb. 28, reported by *Revista Minera*, in metric tons:

Metals.	1908.	1909.	Changes.
Pig and manuf. iron	1,772	4,326	I. 2,554
Copper	1,421	2,789	I. 1,368
Copper precipitate	3,474	2,761	D. 713
Lead	26,304	22,052	D. 4,252
Zinc	402	54	D. 348
Quicksilver	422	211	D. 211
Minerals.			
Iron ore	1,062,628	1,075,208	I. 12,580
Manganese ore	8,674	1,020	D. 7,654
Copper ore	192,487	172,339	D. 20,148
Lead ore	686	370	D. 316
Zinc ore	13,283	18,325	I. 5,042
Fyrites	231,343	162,330	D. 69,013
Salt	92,254	89,219	D. 3,035

Imports of phosphate rock were 20,916 tons in 1908, and 15,832 in 1909; decrease, 5084 tons.

Zinc and Lead Ore Markets

Joplin, Mo., June 12—A number of the heavier producers declined to sell zinc ore this week under a base price of \$45 per ton of 60 per cent. zinc, and in order to fill shipping orders this price had to be met by purchasing agents. This is in excess of a ratio of \$8.50 per ton of 60 per cent. zinc for each \$1 per 100 lb. for spelter, which will need to reach \$5.65 per 100 lb. before it will be equivalent to a ratio of 8 to 1, the limit at which smelters claim there is a living profit in manufacturing spelter. Outputting conditions are good, and the reported discovery of 22 ft. of ore under the blanket

vein in one of the mines north of Webb City, said to carry a higher percentage of concentrate than the blanket vein, offers new possibilities for this ore area. The highest price paid was \$47 per ton, on a base of \$42@45. Heavy silicate shipments, selling at \$17@24 per ton, lowered the average to \$38.96. Lead ore sold as high as \$60 for several hundred tons for next week's delivery, \$59.50 being the highest settling price reported for this week. The average price, all grades, was \$58.42, bidding them stronger on medium-grade purchases.

SHIPMENTS, WEEK ENDED JUNE 12.

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	3,868,080	987,430	\$110,104
Joplin	1,662,170	174,710	40,968
Miami	701,230	156,190	16,363
Duenweg	374,930	207,910	13,344
Galena	523,790	51,710	12,614
Alba-Neck	475,640	.....	10,463
Prosperity	376,890	77,550	10,182
Oronogo	398,200	80,470	8,989
Sarcoile	675,790	.....	7,703
Badger	340,480	.....	7,320
Granby	491,800	8,600	7,145
Aurora	499,520	.....	6,589
Carthage	298,980	.....	5,804
Quapaw	271,240	.....	5,425
Spurgeon	212,690	56,780	4,963
Carl Junction	87,900	.....	1,978
Zincite	79,890	.....	1,717
Stott City	41,620	.....	744
Totals	11,280,640	1,801,350	\$272,384

24 weeks.....271,173,870 43,825,160 \$6,127,096
Zinc value, the week, \$219,755; 24 weeks, \$4,956,129
Lead value, the week, 52,629; 24 weeks, 1,170,967

MONTHLY AVERAGE PRICES

Month.	ZINC ORE.				LEAD ORE.	
	Base Price.		All Ores.		All Ores.	
	1908.	1909.	1908.	1909.	1908.	1909.
January	\$37.60	\$41.25	\$35.56	\$39.46	\$46.88	\$52.17
February	36.63	36.94	34.92	34.37	49.72	60.50
March	36.19	37.40	34.19	34.71	49.90	60.82
April	35.40	38.63	34.08	37.01	52.47	65.63
May	34.19	40.06	33.39	37.42	56.05	66.59
June	33.06	.....	32.07	.....	60.48	.....
July	34.55	.....	31.67	.....	59.90	.....
August	36.53	.....	35.42	.....	60.34	.....
September	37.63	.....	34.44	.....	54.59	.....
October	35.95	.....	33.28	.....	52.66	.....
November	39.13	.....	35.02	.....	54.53	.....
December	42.75	.....	39.63	.....	49.68	.....
Year	\$36.63	.....	\$34.31	.....	\$53.93	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

Platteville, Wis., June 12—The highest price paid this week for zinc ore was \$43; the base price of 60 per cent. zinc was \$42@43 per ton. Offerings of \$57@58 per ton were made for 80 per cent. lead ore; no sales or shipments are reported. The week's shipment was light, owing to three days' steady rain.

SHIPMENTS, WEEK ENDED JUNE 12.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville	528,690	.....	245,900
Strawbridge	385,000	.....	.....
Benton	304,550	.....	.....
Hazel Green	275,350	.....	.....
Galena	240,000	.....	.....
Livingston	80,000	.....	.....
Harker	64,630	.....	.....
Linden	53,370	.....	.....
Total	1,931,590	.....	245,900
Year to June 12	52,212,430	2,316,480	4,391,400

In addition to the above there was

shipped to the American Zinc Ore Separating Company 431,200 lb., and to the Joplin Separator Works 136,400 lb. zinc ore.

Petroleum

June 16—Exports of mineral oils from the United States, five months ended May 31, in gallons:

	1908.	1909.
Crude petroleum	38,948,193	56,784,782
Naphthas	13,823,090	27,555,244
Illuminating oils	443,646,151	410,978,912
Lubricating oils	64,294,792	58,675,765
Residuum	25,783,031	40,909,758
Total	586,495,257	594,854,431

Paraffin is included in lubricating oils. The total increase this year was 8,359,174 gal., or 1.4 per cent.

Chemicals

New York, June 16—Deliveries on contracts continue steady and a little more spot business is noted in several lines.

Copper Sulphate—A fair amount of business is being transacted at unchanged prices, \$4.25 per 100 lb. for carload lots and \$4.50 per 100 lb. for smaller orders.

Nitrate of Soda—Prices are 2.15c. per lb. for spot material and 2.12 1/2c. for futures. A fairly good business is being done at these quotations.

Arsenic—Sales for the week have been light, aggregating only about 75 tons. The market is rather weak, closing at 2 3/4@3c. for white arsenic.

Mining Stocks

New York, June 16—The general stock markets show little change from last week's report. There have been numerous fluctuations in prices in both directions, but no settled tendency in the market. There has been in some special stocks a good deal of liquidation, but others have held well. Prominent in the latter class are the Steel Corporation stocks which remain very strong. Today there was a considerable reaction, with many drops in prices; but at the close there was some recovery.

On the Curb there was moderately active trading only, and the movement of prices was divided, some stocks showing higher prices and others lower. Miami Copper, which has been quiet for some time, was rather prominent in the trading. The Cobalt stocks are looking up and there is a good deal of trading. Nevada stocks are inclined to be quiet.

It is reported that a controlling interest in stock of the old Quicksilver Mining Company, of California, has been sold to London parties.

Boston, June 15—There has been little in price movements the past week to incite public interest in the local mining-share market. North Butte has been

active at times and made a high at \$63.37 1/2 with subsequent reaction to below \$59, ex-dividend of \$1. It is generally believed that control of this company is lodged in hands close to Amalgamated Copper interests.

Mass mining has been less conspicuous with an extreme fluctuation of \$2, or from \$11 to \$9. By official utterance the company admits that the recent mill run was but 18 lb. of mineral to the ton of rock treated.

American Zinc and Franklin mining have both been in the limelight. The former stiffened \$1.25 to \$27.12 1/2 largely on pool orders. About all the stock offered has been taken.

Amalgamated is off \$1.75 net for the week to \$84.62 1/2, but the decline occurred almost entirely today, and the weakness of the New York market was responsible for it.

Price changes on the Curb are slight in net results for the week. Activity continues in the better grade of stocks, which is the encouraging feature.

N. Y. INDUSTRIAL table with columns for company name and price.

ST. LOUIS June 12 table with columns for company name and price.

BOSTON CURB Low table with columns for company name and price.

LONDON June 16 table with columns for company name and price.

Furnished by Hornblower & Weeks, N. Y. Cabled through Wm. P. Bonbright & Co., N. Y.

NEVADA STOCKS. June 16. Furnished by Weir Bros. & Co., New York.

Table of Nevada Stocks with columns for Name of Comp., Clg., and price.

Table of Colorado Springs Stocks with columns for Name of Comp., Clg., and price.

STOCK QUOTATIONS

Main Stock Quotations table with columns for New York and Boston prices for various companies.

GOLDFIELD STOCKS table with columns for company name and price.

Table of Goldfield Stocks with columns for company name and price.

Assessments

Assessments table with columns for Company, Delinq., Sale, and Amt.

Monthly Average Prices of Metals SILVER

Monthly Average Prices of Metals SILVER table with columns for Month, New York, and London prices.

New York, cents per fine ounce; London, pence per standard ounce.

COPPER

COPPER table with columns for Month, New York (Electrolytic and Lake), and London prices.

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

TIN AT NEW YORK

TIN AT NEW YORK table with columns for Month, 1908, 1909, and prices.

Prices are in cents per pound.

LEAD

LEAD table with columns for Month, New York, St. Louis, and London prices.

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

SPELTER table with columns for Month, New York, St. Louis, and London prices.

New York and St. Louis, cents per pound. London in pounds sterling per long ton.

Mining and Metallurgical Companies—U. S.

Table listing Mining and Metallurgical Companies in the U.S. with columns for Name of Company and Location, Shares (Issued, Par Val), and Dividends (Total to Date, Latest Date, Latest Amt).

Coal, Iron and Other Industrials—United States

Table listing Coal, Iron and Other Industrials in the United States with columns for Name of Company and Location, Shares (Issued, Par Val), and Dividends (Total to Date, Latest Date, Latest Amt).

*Since 1894. †Since 1907. ‡Since 1890. §Stock div. \$6,130,000 Mar. '09

Canada, Mexico, Central and South America

Table listing companies in Canada, Mexico, Central and South America with columns for Name of Company and Location, Shares (Issued, Par Val), and Dividends (Total to Date, Latest Date, Latest Amt).

*Mexican Currency. †Since reorganization. ‡Since August, 1905.

*Previous to consolidation \$1,436,250 were divided. †Amalgamated.

Industrials

A book on blast hole drilling with well drills is being compiled by the Keystone Driller Company, of Beaver Falls, Penn., to be published in connection with the 1909 edition of Catalog No. 4. The editor will be glad to receive from any source drilling records and general information on the subject to be embodied in the text. The book will be distributed freely among reputable engineers and contractors.

Particularly noteworthy of present activity is a contract placed with Allis-Chalmers Company by the Milwaukee Electric Railway and Light Company for two 1500-k.w. motor-generator sets, one 500-k.w. balancer, six 2000-k.w. transformers, two 300-k.w. transformers, two 300-k.w. motor generator sets and a 300-k.w. generator of the water-wheel type, much of this apparatus constituting a "repeat" order.

The Bulger Block Coal Company's mine, at Bulger Station, Penn., is located in what is known as the Pan Handle district, where the conditions with respect to the application of coal-mining machines are notoriously severe, because of the presence of sulphur bands and "nigger heads" at the bottom of the vein where the cutting is done. After a thorough trying-out process two pneumatic coal punchers have been installed for use in conjunction with electric chain machines.

The department of water supply of the city of New York has been supplied with three 1500-ft. portable drilling machines by the Keystone Driller Company, of Beaver Falls, Penn. The machines are to be used for putting down wells on Long Island for the water supply of the borough of Brooklyn. The rigs are the same as the regular No. 15 oil rig, except that the boiler, which is mounted on a separate truck and located at a distance for oil and gas drilling, is in this case mounted on the machine.

The city of Bellevue, Iowa, has placed an order for a Foos three-cylinder vertical engine with gas producer complete, with the Foos Gas Engine Company, Springfield, Ohio, to replace a steam engine in the city electric-light plant. This will run in parallel with a steam engine, it being anticipated that the remaining steam engine will be displaced by another like engine. This improvement will make a large saving in operating expenses. The Foos Company are doing a large business in these producer plants, both for electrical work and pumping installations, and anyone considering equipment in this line should communicate with them.

The Wood Drill Works has issued a booklet entitled "Glimpses of the Panama Canal," which is a non-technical review of the canal by Warren Wood, proprietor of the Wood Drill Works, and Robert J. Wood, manager of the Chicago offices. It is a 16-page booklet, 9x6, containing cuts of the Gatun Dam, Culebra cut, the old Santo Domingo church, and several cuts of the "Wood" rock drills at work on the Porto Bello quarry, the rock from which will be used in the construction of the Gatun Dam; also a picture entitled "Jumbo and the Brownie," showing the largest and smallest drills made by that concern, Jumbo having a capacity of 50 feet and Brownie four feet. Copies can be obtained at any of the company's sales offices.

Along with other industrial organizations which have reported substantial gains in business during the last two months, the Western Electric Company's April returns make a slightly better showing than March, which was considerably the best month in the fiscal year to that time, and April, 1909, is nearly 50 per cent. ahead of the returns for April, 1908. In view of the company's steady expansion during the last ten years and the high record for the peak year of 1906, when sales ran up to \$69,245,331, an increase of more than \$25,000,000 over the preceding year, it is difficult to determine, in making comparisons, what shall be taken as the "normal" year, but at the present time

the Western Electric is operating at the annual rate of 65 per cent. of the record of 1906 and about 85 per cent. of the record of 1907, which was the second best year in the company's history, with sales totaling \$52,724,168.

The American Locomotive Company has recently issued pamphlet No. 10,035 of the above title, which illustrates and describes the joint exhibit of that company and the Atlantic Equipment Company at the exposition now in progress at Seattle, Washington. The exhibit consists of a rotary snow plow, built for the Chicago, Milwaukee & Puget Sound Railway; two locomotives, each representing the builder's new standard design of its type; one, a six-coupled tank or 2-6-2 T-type locomotive for logging service, and the other, a 10-in. by 16-in. four-wheel saddle tank contractors' locomotive; an electric motor and trailer truck, built for the Southern Pacific Company, and a new model, class 45-16-2-1, Atlantic steam shovel. A separate chapter is devoted to each equipment exhibited in which is illustrated the machine itself, and the special features of the design are briefly described. Reference is also given in each chapter to other of the company's publications presenting different designs and types of the same class of equipment, and on page 31 is an index of all the catalogs in print issued to date by the two companies.

The Macbeth Iron Company, of Cleveland, Ohio, and the Bruce-Meriam-Abbott Company, also of Cleveland, were consolidated on June 1, the name of the new company being the Bruce-Macbeth Engine Company. Both of the above companies have been long established in Cleveland, and their amalgamation makes one of the largest and strongest companies of its kind. The Macbeth Iron Company dates from the year 1870, having been known until late years as Macbeth and Company; the Meriam-Abbott Company, predecessor of the Bruce-Meriam-Abbott Company, was organized in 1900, and has been one of the pioneers in the manufacture of the commercial gas engine and its development to the present standard of perfection. It is the purpose of the Bruce-Macbeth Engine Company to continue the business of both of the former companies on a much larger scale than before. The manufacture and development of the gas engine will be continued and the former line of work of the Macbeth Iron Company, building of blowing engines and general machine and foundry work, will be conducted as heretofore.

The Cyclone Drill Company, of Orrville, Ohio, has made the following shipments of machines in the past few days: two complete core drilling outfits for E. C. Hargrave, to be used on his property near Port Arthur, Canada; blast hole drill to the Rio Tinto Company for its railroad construction in Spain; large prospecting machine to W. H. C. Downes, which will be used in western Australia; complete prospecting outfit for the Santa Rita Company in New Mexico, which is the third machine purchased in the past few months; two prospecting outfits to the Rockdale Iron Company, which will be used for prospecting iron ore in Tennessee; complete prospecting outfit for the Napier Iron Company, which will also be used for prospecting iron ore in Tennessee; well drilling machine and equipment to G. A. Amsinck & Co., Columbia, S. A.; also a great many local shipments covering the regular types of machines and a number of gasoline traction outfits. The company reports a splendid business during the spring and an increasing number of inquiries for various kinds of equipment. The factory is running full time and increasing its working force.

In a pamphlet entitled "Automatic Draft Control for Steam-Boiler Furnaces," the Green Fuel Economizer Company, of Matteawan, N. Y., describe an improved appliance recently brought out by that concern for so regulating the draft of steam boilers that the pressure within the fire-box is at all times neutral. To accomplish this end just enough pressure is supplied under the grates to force the air through the fuel,

while enough draft is applied in the smoke flue to draw the gases of combustion through the boiler. This is said not only to give the ideal proportion of air for perfect combustion at all loads but also to prevent the escape of flame and hot gases of combustion through the open fire-door and through crevices in the brick-setting, as where forced draft is used, while also preventing the drawing in of cold air and the dilution and consequent cooling of the gases of combustion, as where induced draft only is used. This system of draft has an important bearing in connection with the researches which have recently been made by the engineers of the United States Geological Survey with the object of increasing greatly the rate of steam production per sq. ft. of heating surface in steam boilers.

A new booklet of 24 pages, entitled, "The Proper Care of Belts," recently gotten up by the Joseph Dixon Crucible Company, Jersey City, N. J., is divided into three sections, headed respectively: Belts, belt dressings, and hints, kinks, tables. The first section deals with the running condition of belts; the second takes up treatment with various preparations; and the third, as the title indicates, has some general points upon belting and its use. This last section contains a considerable amount of interesting and valuable matter collected from many authoritative sources. It tells what results were secured in a plant where records were kept over a period of years; gives the economical speeds at which leather belts should be run; has some matter telling of the different styles of joints, illustrating three methods of leather lacing; contains rules for calculating speed of pulleys; gives horsepower transmitted by various sizes of single and double belts, etc. Anyone who has any amount of belting under his care should have a copy of this booklet. While it is gotten out in the interests of the traction and solid belt dressings that the Dixon company places on the market, it contains so much matter of general interest as to be valuable to the practical man. Those desiring a copy of this booklet may secure same by writing direct to the home office of the Joseph Dixon Crucible Company, at Jersey City.

Trade Catalogs

Sprague Electric Company, 527 West 34th street, New York. Circular. Electric shovels. Illustrated.

The General Engineering Company, Salt Lake City, Utah. Bulletin. Ore testing. Illustrated, 44 pages, 6x9 inches.

The Watt Mining Car Wheel Company, Barnesville, Ohio. Catalog. Mine car couplings. Illustrated, 16 pages, 5½x8 inches, paper.

C. Harzer & Co., Finsbury Pavement House, London, E. C. Catalog. Freygang patent levigating and leaching apparatus. Illustrated, 10 pages, 6x10 inches, paper.

Iszard-Warren Company, 1122 Vine street, Philadelphia, Penn. Catalog. Sterling surveying instruments and drawing materials. Illustrated, 228 pages, 6x9 inches, paper.

Lehigh Car, Wheel and Axle Works, Fullerton Penn. Pamphlet. Hydraulic Properties of Reground Cement Mortars, and also dissertation on Fuller-Lehigh pulverizer mill. Illustrated, 16 pages, 6x9 inches, paper.

American Locomotive Company, 30 Church street, New York. Pamphlet. Exhibit of American Locomotive Company and Atlantic Equipment Company at Alaska-Yukon-Pacific Exposition. Illustrated, 32 pages, 6x9 inches.

Allis-Chalmers Company, Milwaukee, Wis. Bulletin No. 1410. Gates tube mill for wet pulverizing in mining work. Illustrated, 24 pages, 8x10½ inches. Bulletin No. 1438. "Two Notable Milling and Cyanide Plants." Illustrated, 32 pages, 8x10½ inches.