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The Modern American Blast Furnace

How the Modern Blast Furnace Is Constructed; How It Is Charged, and How the Blast Is Supplied and Heated

BY BRADLEY STOUGHTON*

In the modern blast furnace, according to American practice, much attention has been paid to the various devices for handling the material and charging the furnace. The object has been to save time, to keep the furnace working to full capacity, and to dispense with manual labor as far as possible.

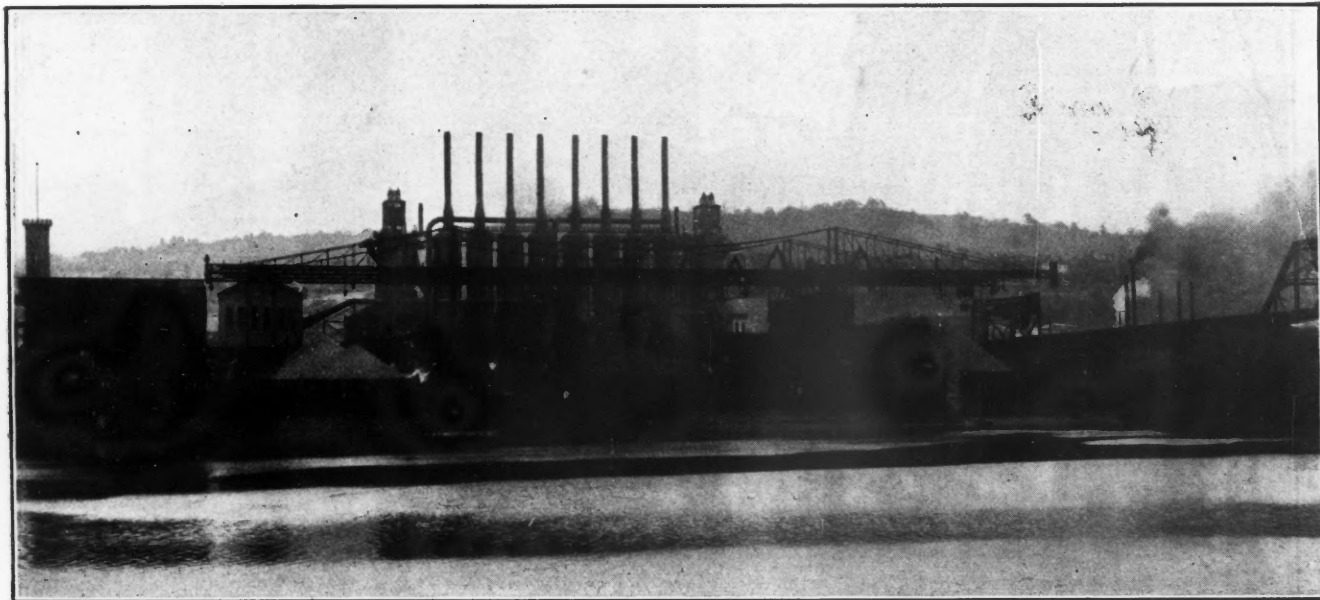
HANDLING THE RAW MATERIAL

Behind the blast furnace are situated two long rows of storage bins, one of which is shown in elevation in Fig. 1. These bins are filled by bottom-dumping railroad cars, which bring the ore to the

naces, working at top speed, the amount of material which must be dumped into the top during 24 hours will frequently exceed 2000 tons, and the charging must go on for 365 days a year with never a delay of more than a few hours at a time.

In the modern type of furnace this loading is accomplished altogether by mechanism operated and controlled from the ground level, and no men are required to work at the top of the furnace. Fig. 1 also shows such a furnace in process of loading. A double, inclined skipway extends above the top of the furnace. One skip discharges its load of ore, fuel or flux,

also closed at the bottom by a similar bell. The lowering of this bell is also controlled by mechanism operated from the ground level. At intervals this operation is effected, and the content of the hopper allowed to fall in an annular stream, distributing itself in a regular layer on top of the material already in the furnace and reaching to within a few feet of the bottom of the bell. As the upper bell is now held up against the bottom of the upper hopper, there is never a direct opening from the interior of the blast furnace to the outer air, so that the escape of gas, resulting formerly in the long flame rising



ORE HANDLING PLANT AT CARRIE FURNACES, NOS. 3 AND 4, RANKIN, PENN.

furnaces, or by mechanical apparatus from the great piles of ore stored conveniently near. Between and under these two rows of bins runs a track on which little trains of ore buggies are transferred back and forth, being first filled with a weighed amount of ore, limestone or fuel, and then switched into a position where they can deposit their contents into the loading skip of the blast furnace.

LOADING THE FURNACE

In one of the big modern American fur-

into the hopper, while the second skip is at the bottom of the incline ready to be loaded with its charge.

DOUBLE BELL AND HOPPER

The upper hopper of the furnace is closed at the bottom by an iron cone, known as a "bell." This bell is pressed up against the bottom of the hopper by the lever of the counterweight, as shown, but may be lowered by operating the cylinder shown at the side to allow the charge to fall into the true hopper of the blast furnace. In this way the true hopper of the furnace is progressively filled with ore, flux and fuel. This hopper is

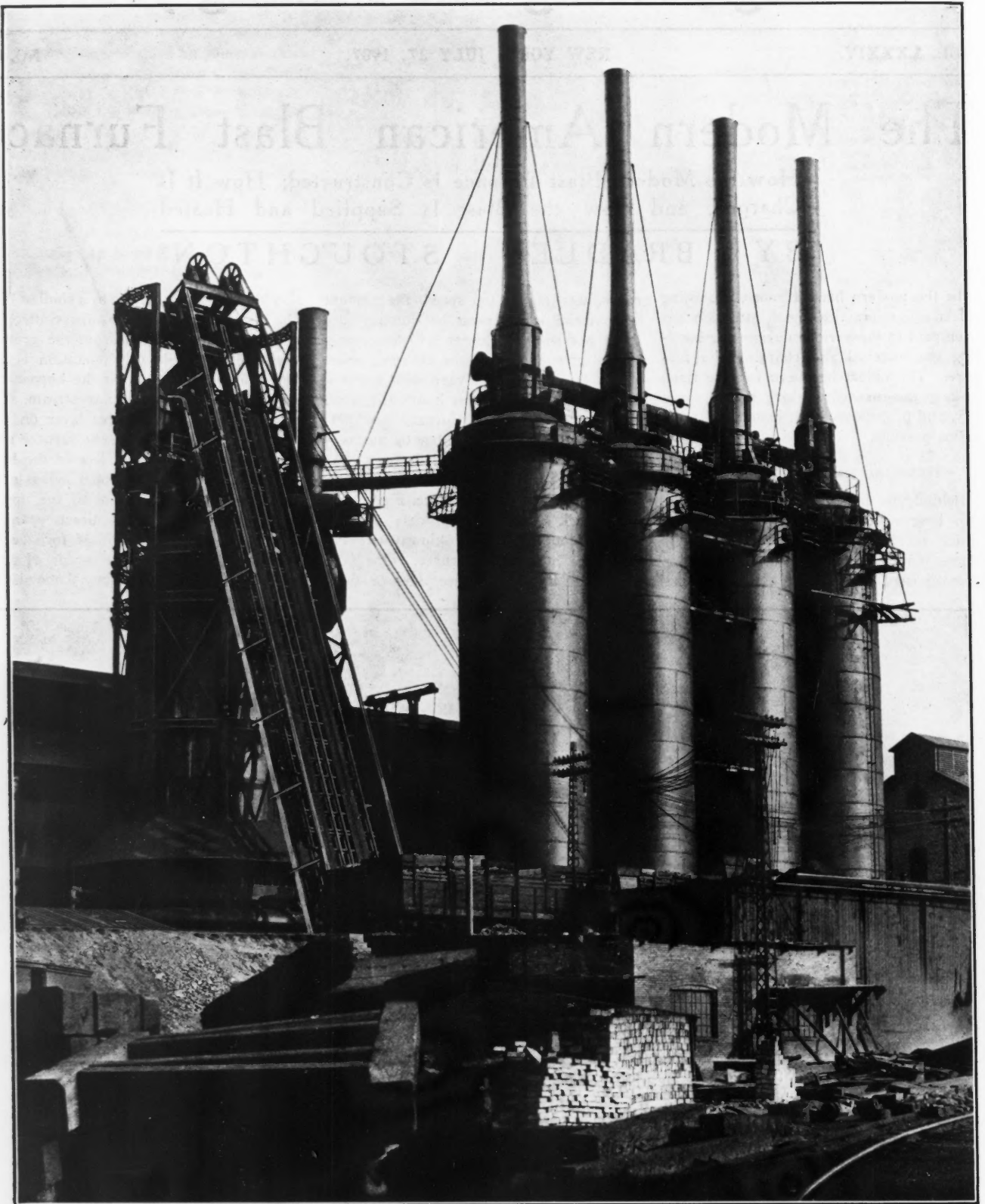
from the top of the blast furnace whenever material was dropped into the interior, no longer occurs at our modern plants.

This is not the only means of handling the raw material for the blast furnace. Several varieties of mechanism are extensively used, but the description given heretofore is illustrative of the general principles of labor-saving handling in connection with charging the blast furnace.

THE BLAST FURNACE AND ACCESSORIES

The blast furnace itself consists of a tall cylindrical stack lined with an acid (silicious) refractory firebrick, the gen-

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BLAST FURNACE WITH MATERIAL HOIST AND HOT-BLAST STOVES

eral form and dimensions being shown in Fig. 1. The hearth or crucible is the straight portion occupying the lower 8 ft. of the furnace. Above that extends the widening portion, called the bosh, which reaches to that portion in the furnace having the greatest diameter. The stack extends throughout the remainder of the

furnace, from the bosh to the throat. The brick work of the hearth is cooled by causing water to trickle over the outside surface.

TUYERES

Through the lining of the furnace, just at the top of the hearth, extend the tuy-

eres—eight to 16 pipes having an internal diameter of 4 to 7 in., through which hot blast is supplied. The "tuyere notches," or openings through which the tuyere pipes enter, as well as the tuyeres themselves, are surrounded by hollow bronze rings set in the brick work, through which cold water is constantly flowing to

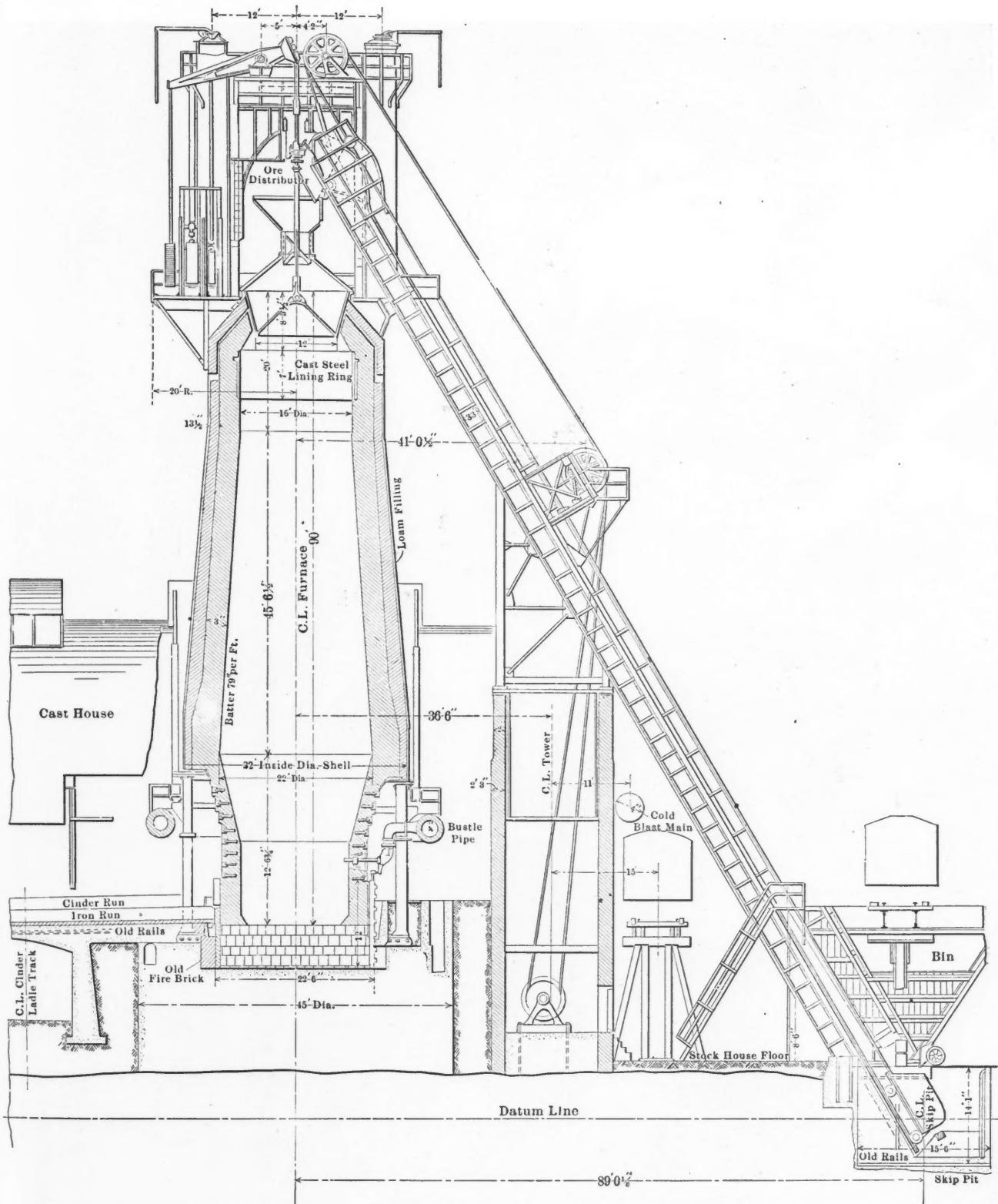


FIG. 1. SECTION OF BLAST FURNACE AND MATERIAL HOIST

protect them from being melted off at the inner ends. The number and size of the tuyeres are regulated in proportion to the diameter of the hearth, the volume and pressure of the blast, etc., so that the velocity of the blast shall distribute it as evenly as possible to the very center of the furnace.

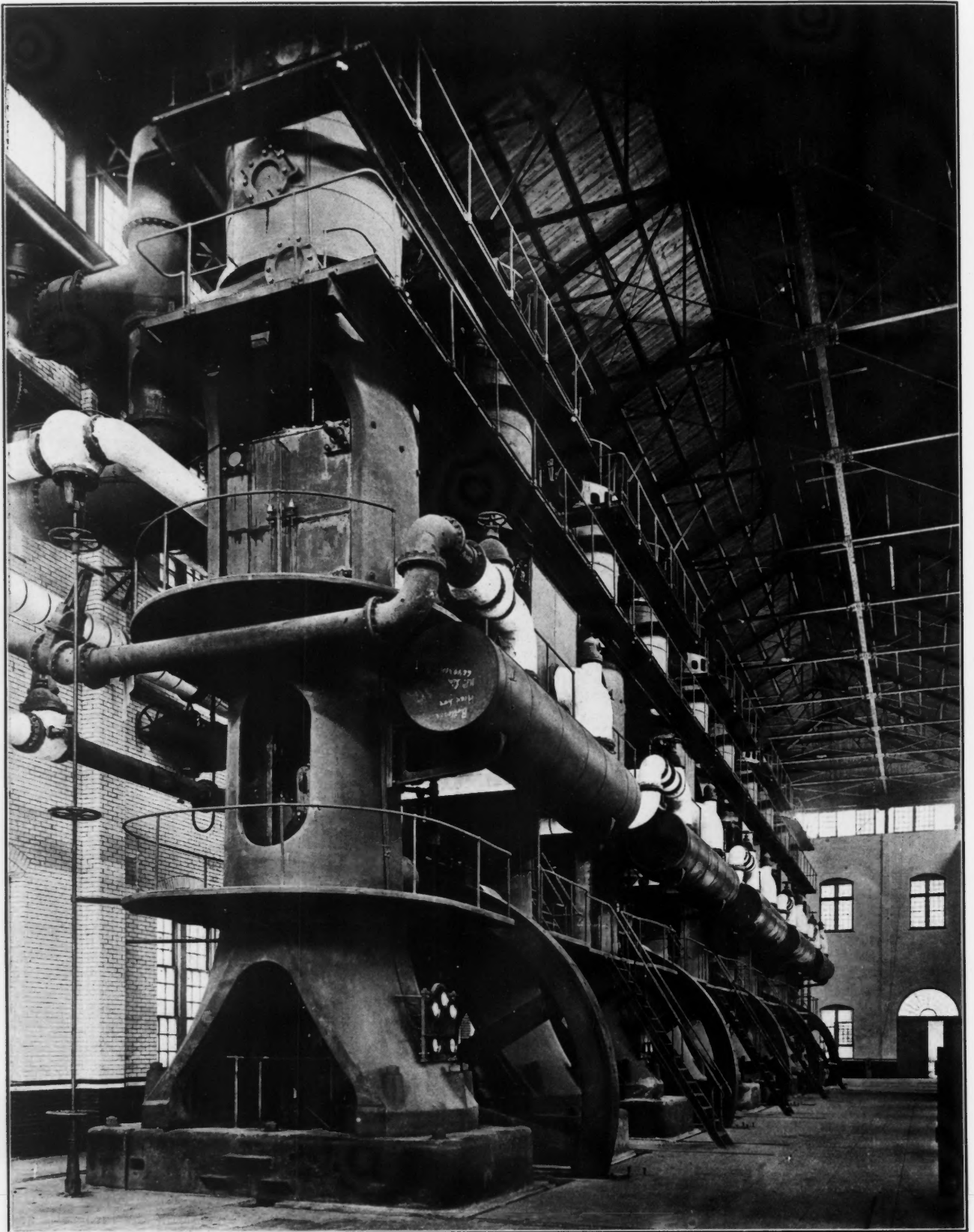
DISCHARGE HOLES

On the side of the furnace, and 30 to

40 in. below the level of the tuyeres, the "cinder notch" or "monkey" is situated. This is protected by a water-cooled casting, and the hole is closed by an iron plug, or bott. In the front, or breast, at the very bottom level of the crucible is the iron tap-hole, from which all the liquid contents of the furnace can be completely drained. This is a large hole in the brick work, and is closed with several balls of clay.

BOSH

The hottest part of the furnace is near the tuyeres and for a few feet above them. In order to protect the brick work of the bosh from this heat a number of hollow wedge-shaped castings are placed therein, through which cold water circulates. The brick work is furthermore protected by a deposition of a layer of carbon, similar to lamp black, on its internal surface, covered by a layer of a sort of slag, replac-



BLOWING ENGINES, MESTA MACHINE COMPANY

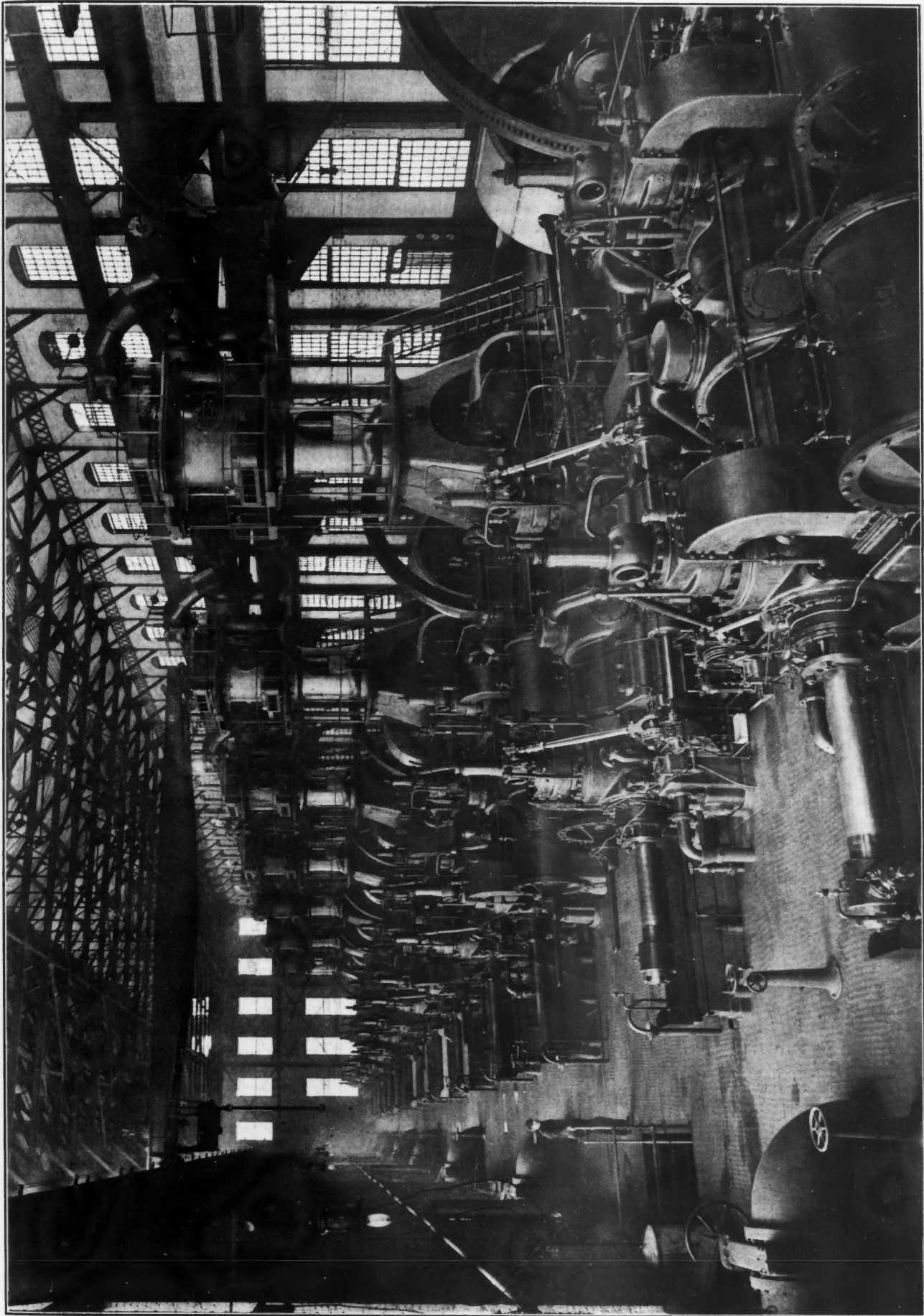
ing part of the brick work. This deposition of carbon comes about through the reaction of the furnace operation itself. For the correct conduct of the smelting operation, and especially for the carrying off of the sulphur in the slag, it is neces-

sary that a very powerful reducing influence must exist; this reducing influence is produced by an excess of coke and one of its results is the precipitation of finely divided carbon on the internal walls of the furnace. It is this thin layer of slag

and carbon which is most effective in protecting the acid lining of the furnace from the corrosive action of the basic slag.

HOT BLAST

The air for smelting is driven into the



BLOWING CYLINDERS DRIVEN BY 2000-H.P. GAS ENGINES, LACKAWANNA STEEL COMPANY PLANT.

furnace by blowing engines up to 2500 h.p. each, and capable of compressing 50,000 to 65,000 cu.ft. (4875 lb.) of free air per minute to a pressure of 15 to 30 lb. per sq.in., which is about what one furnace requires¹. It actually requires about four to five tons of air for each ton of iron produced in the furnace. After leaving the engines and before coming to the furnace the air is heated to a temperature of 800 to 1200 deg. F. by being made to pass through the hot-blast stoves. A battery of the blowing engines used is shown in the accompanying engraving, which gives an idea of the size and power of the engines required.

HOT-BLAST STOVES

Each furnace is connected with four stoves. These are cylindrical tanks of steel about 110 ft. high and 22 ft. in diameter, containing two firebrick chambers. One of these chambers is open and the other is filled with a number of small flues (see Fig. 2). Gas and air are received in the bottom of the open chamber, in which they burn and rise. They then pass downward through the several flues, in the annular chamber surrounding the open chamber, and at the bottom pass out to the chimney as waste products. In passing through the stove they give up the greater part of their heat to the brick work. After this phase is ended the stove is ready to heat the blast. The blast from the blowing engine enters at the bottom of the flues, passes up through the outer chamber, down through the central chamber and to the furnace. In this passage it takes up the heat left in the brick work by the burning gas and air. Sometimes there are three passes, instead of two, as described. In a blast-furnace plant one stove is heating the blast while the other three are simultaneously in the preparation stage, burning gas and air. By changing once an hour a pretty regular blast temperature is maintained. The gas used for the heating is the waste gas from the blast furnace itself, which amounts to about 90,000 cu.ft. per minute at a temperature of 450 deg. F., and has a calorific power of about 85 to 95 B.t.u. per cu.ft. The latent and available heat of this gas is equivalent to approximately 50 per cent. of that of the fuel charged into the furnace. Only about 30,000 cu.ft., or one-third of this gas, is needed for keeping the stoves hot and the remaining two-thirds is used to produce power. If the stoves become clogged with dust, a larger amount of gas is required to keep up the temperature.

POWER FROM WASTE GAS

The waste gas comes down the down-comer, settles out dirt in the dust-catcher, and is then led to the stoves or the power producer. This gas varies in composition

¹At 70 deg. F. and atmospheric pressure each 1000 cu.ft. of air weighs 75 pounds.

but will average about 61 per cent. nitrogen, 10 per cent. to 17 per cent. CO₂ and 22 per cent. to 27 per cent. CO. The latter can be burned with air to produce heat. If burned under boilers, the available gas will generate enough power to operate the blowing engines, hoisting mechanism, and other machinery used in connection with the furnace. At several plants the gas available for power is cleaned carefully and utilized in gas engines, whereby much more power is obtained, the excess over that necessary to furnish blast and the mechanical requirements of the furnace being usually con-

nance, character of slag made, etc., but will extend from the level of the tuyeres to a few feet above them; that is, about to the top of the bosh. It will require perhaps 15 hours for the material to descend from the top of the furnace to the smelting zone. During this descent, it is upheld partly by the resistance of the upward rushing column of hot gases¹, partly by its friction against the walls of the furnace, and partly by the loose column of coke which extends through the smelting zone and to the bottom of the furnace and which alone resists melting in the intense heat of this zone. The blast, entering the furnace through the tuyeres, consists of 23 per cent. by weight of oxygen, 77 per cent. by weight of nitrogen, together with varying amounts of water vapor from moisture in the air.

In a subsequent article the chemical reactions taking place in the furnace itself will be fully explained.

The Gayley Dry Blast

An excellent record was made at the Isabella furnaces of the Carnegie Steel Company with the Gayley dry blast in May. A comparison of the work of No. 1 furnace, working with dry air, and of No. 2 furnace, blown with natural air, both using the same materials, shows the following results:

	Daily Product.	Coke Consumption.
No. 1, dry air.....	459 tons.	2,029 lb.
No. 2, natural air....	351 tons.	2,372 lb.

This shows that the average product per day was greater by 108 tons, or 30.7 per cent., with the dry-air blast than with natural air, and that the fuel consumption was 343 lb. per ton, or 14.4 per cent., lower. The extraordinary results obtained with the furnace blown with dry air have been achieved in spite of its bad condition, it being in need of re-lining, having now produced nearly 612,000 tons of pig iron on one lining.

In cement works having 6x60-ft. rotary kilns, it generally requires 200 lb. of coal to burn one barrel of cement. Slack coal is generally used, the percentage of ash varying from 5 to 15. Some manufacturers have reduced the fuel consumption to 85 lb., but in the majority of cases it is about 120 lb. per barrel. This does not include the coal used in drying the raw material and drying the coal itself, nor the coal required for power; these items increase the consumption to about 150 lb. per barrel. With an average price of coal at \$2, the cost of fuel per barrel is consequently 15c. According to E. C. Soper, the average cost of manufacturing Portland cement in a modern plant in the Lehigh district is 70c. per barrel.

¹There is a great fall in the pressure of the blast between the tuyeres and the throat, which represents the work done by the air in supporting the stock.

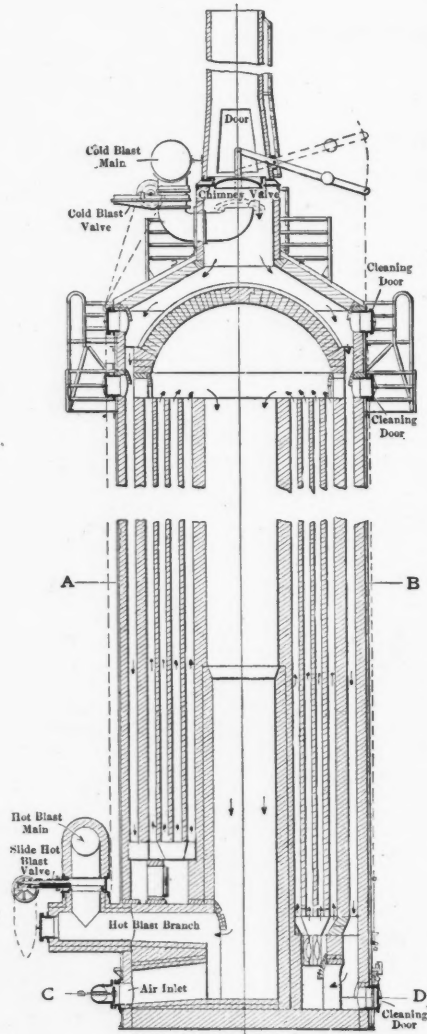


FIG. 2. MCCLURE HOT-BLAST STOVE

verted into electricity and transmitted to more distant points. A battery of gas-driven blowing engines at the works of the Lackawanna Steel Company at Buffalo is shown in the accompanying engraving.

SMELTING PRACTICE AND PRODUCTS

The furnace is filled with alternate layers of fuel, flux and ore, down to the top of the smelting zone. The exact location of this zone will be dependent upon the volume and pressure of blast, size of fur-

Diamond Mining*

BY FRANK D. HILL†

For a long time it was supposed that diamond mines in South Africa were only to be found in the neighborhood of Kimberley and in the district farther to the east, in the Orange River Colony, where the Jagersfontein and Koffyfontein pipes are situated. Within the last few years, however, diamond pipes have been found in many other parts of the country, and among them may be mentioned the Premier, Montrose, and Schuller pipes near Pretoria, in the Transvaal; the Lace and New Randfontein Reefs pipes near Kroonstad, and the Victor pipe near Boshof, in the Orange River Colony; while the Peizer, New Weltevrede, and Frank Smith have been discovered to the northwest of Kimberley.

VALUE OF THE DIAMONDS

The price of diamonds has been controlled for some years by a powerful combination of diamond merchants in London. No difficulty has been found in maintaining the price, and since the Boer war, more particularly, the value per carat has been steadily rising. The question as to the possibility of keeping up the price of diamonds with a largely increased supply in prospect is one that is frequently asked, and leading authorities are agreed that at least twice the present annual supply could be absorbed without affecting the price per carat. It is considered, however, that as regards only the better class stones there will always be a demand. The value per carat of the diamonds recovered from the principal producing mines according to their latest reports is: De Beers and Kimberley, \$12.68; Wesselson, \$8.86; Bultfontein, \$8.38; Dutoitspan, \$16.78; Jagersfontein, \$13.86, and Premier, \$5.64.

The first four mines all belong to De Beers Consolidated Mines. These figures are merely averages, and do not imply that there are no good stones found in the Premier mine, or no poor ones, say, at Dutoitspan. Every mine produces a certain amount of rubbish worth about \$2.16 a carat, and the percentage of these poor stones found determines the average value of the yield. Thus at the last Premier meeting one of the directors pointed out that 75 per cent. of the total money value produced was represented by diamonds worth \$12.60 per carat and the balance of 25 per cent. was made up of diamonds worth \$2.16 per carat.

Similar variations in value occur in the stones found in all diamond mines. As showing the gradual increase in the average price realized per carat during the last 20 years, the following figures, taken

from the report of the New Jagersfontein mine are of interest; 1887, \$6.80; 1891, \$8.92; 1895, \$7.46; 1899, \$8.28; 1903, \$13, and 1905, \$13.88. Since the issue of the report for 1905 the average price per carat has risen a further 5 per cent.

OUTPUT OF DIAMONDS

According to their annual report for 1890, the combined output from the De Beers mines and New Jagersfontein was about 1,550,000 carats, while in 1899 the two companies together produced some 3,130,000 carats. At the outbreak of the Boer war, however, the diamond-mining industry became completely disorganized, and the mines have apparently hardly yet returned to the 1899 rate of production. Thus, according to the reports of De Beers and New Jagersfontein for 1905, it appears that the total number of carats won by these companies for the year was about 2,166,000 carats, or a decrease of 960,000 carats as compared with the figures for 1899. It should be understood that the figures are merely approximate, as it is impossible to find from the De Beers report for 1905 the number of carats actually recovered.

As a set-off to the shortage in the output of these older companies, the Premier mine during 1905 won 845,652 carats, so that the total output from South Africa is at present very nearly what it was at the period just before the war. The other South African producers have been of little importance, but there are at least three mines which are expected some day to turn out large quantities of diamonds at a handsome profit. These are the Lace, the Roberts Victor, and the New Randfontein Reefs mines. Of these the Lace mine has already produced over 60,000 carats, is fully equipped with a washing plant, and has some 750,000 loads of blue ground on the floors. It will very shortly enter the regular producing stage, and a grade of from 14 to 20 carats per 100 loads washed is anticipated. The Roberts Victor and the New Randfontein Reefs are little more than prospecting ventures at present. In each case, however, a pipe has been found, and preliminary trials with a small washing plant point to a return of rather over 20 carats to the 100 loads, the average quality of the stones found being very satisfactory.

FUTURE OUTPUT—DEVELOPMENT IN WORKING

Any estimate of the probable future annual production of diamonds must necessarily be a very rough one, but it is apparent that there will be a large increase, even if no further new discoveries are made. By 1908 it may be assumed that the new mines discovered will be equipped and will have become regular producers. The probable increase in the output of diamonds for that year compared with the 1905 returns may be estimated as follows: The returns from De Beers and

Jagersfontein will be assumed to be the same as in 1905. The increase is figured at 1,200,000 carats for the Premier mine, 80,000 for Lace, 100,000 for Roberts Victor, and 200,000 for the New Randfontein Reefs, or a total increase of 1,580,000 carats. No account has been taken of the many low-grade mines whose output is not of sufficient importance to affect the total in any serious way. Among these may be mentioned the Koffyfontein, Kamfersdam, New Weltevrede, Frank Smith, and Peizer mines.

THE PREMIER MINE

The Premier is by far the largest and most valuable individual diamond mine ever found in South Africa, and it is probably not an exaggeration to say that it is one of the most valuable mines of any kind ever discovered in the world. It is estimated that when its full plant is at work it can make profit at the rate of \$9,648,000 a year, the life of the mine on this basis being well over 50 years. Considerable interest will be taken in the attempt which is to be made at the Schuller mine to treat blue ground in tube mills. The diamondiferous ground at this mine will not decompose when subjected to atmospheric agencies, so that it is necessary to disintegrate it by mechanical means. If crushers or rolls be used for this purpose the diamonds, which are brittle, although extremely hard, are broken as well as the matrix, but in the grinding action which takes place in a tube mill it is thought that the diamonds will be separated from their inclosing minerals without being fractured. Experiments carried out on a small scale point to the feasibility of this arrangement, and if further experiments prove successful, the adoption of tube mills will revolutionize the treatment of blue ground in diamond mines by doing away with the expensive and tedious process of flooring, which adds both to the cost and the capital expenditure.

According to the new Transvaal diamond law, the government has a right to take up to 60 per cent. of the profits of any diamond mines found in the colony, after allowing for all capital expenditure necessary to equip the mine. A law on the same lines has been promulgated in the Orange River Colony, although in this colony the maximum share that the government can claim is 40 instead of 60 per cent.

PRICES ADVANCED—YIELD AND PROFITS

Nearly all the diamonds cut in Amsterdam are of South African origin, and are sold under contract by the De Beers company to the syndicate in London, all others engaged in cutting diamonds being compelled to buy their "rough" from the syndicate. On June 30, 1906, a new contract was entered into between the De Beers and the syndicate for five years, by which prices of the various series were

*Abstract of article in *Daily Consular and Trade Reports*, June 15, 1907.

†American consul at Amsterdam.

raised 20 per cent., the syndicate paying for rough diamonds now an average price of \$16.80. The average value per carat of the yield of the several mines last year was as follows: De Beers and Kimberley, \$14.86; Wesselton, \$10.50; Bultfontein, \$10.30; Dutoitspan, \$19.42. At a recent meeting the chairman of the De Beers mines said: "Turning to the accounts it will be seen that the diamonds produced realized \$27,051,627, as against \$23,168,919 for the previous year, an increase of \$3,882,708, this enhanced output being readily disposed of by the syndicate to whom we sell our production. The demand for diamonds is increasing to such an extent that we have been compelled to largely extend our washing operations in order to cope with the requirements of the industry, and I should not be surprised if the sales for the year ending June 30 next largely exceed the quantity sold during our last financial year. This is not the result of any spurt in the diamond market, but the demand has been strong for the last seven years and appears to be still visibly increasing. The demand is so great that despite the growth of the output our diamonds realized a much higher price per carat last year than during the financial year ended June 30, 1905, America again being our best customer. It was decided two years ago to accumulate sufficient blue on the floors to give the benefit of two wet seasons before being treated. Two years ago there were less than 4,000,000 loads of blue on our floors. Today our stock of blue amounts to over 8,300,000 loads."

LARGE DIVIDENDS

The profitable nature of this great monopoly is shown by the fact that a semi-annual dividend of 20 per cent. has been declared on the preferred shares of the De Beers mines and a dividend of 35 per cent. on the deferred shares. The report of the Premier mine (Transvaal), contains interesting data. Its production for the year ended October, 1905, was 845,652 carats. The company declared two dividends of 125 per cent. on the common shares and one of 400 per cent. on the deferred shares. Such enormous dividends out of the 40 per cent. of the profits, left after paying the Transvaal government its share of 60 per cent. of the profits according to law, show the remarkable position of the company. The output for the 12 months ending during the fiscal year was 899,746 carats, or an increase of 54,094 carats over the previous year. While the De Beers company paid \$450,000 to the Cape government last year as direct taxation or participation in profits, the Premier company paid the Transvaal government \$1,787,075 during the same period. According to an article by an American authority, the De Beers mines had produced up to May 1, 1903, over \$500,000,000 of uncut diamonds.

MOVING DE BEERS OFFICES TO NEW YORK

On the somewhat startling idea of moving the selling offices of the De Beers Consolidated Mines from London to New York in order to escape the English income tax (a double tax of about \$500,000, inasmuch as the Cape government imposes a \$500,000 income tax) and back taxes of \$3,500,000, I prefer to quote the words of the chairman at a late meeting. The chairman said: "The real business of the company—that of producing diamonds from the soil—is absolutely confined to Kimberley. If the London office were closed tomorrow, it might inconvenience the English and continental shareholders and would certainly decrease the company's purchases of mining machinery and supplies in England, which amounted to \$2,170,800 for the two years ended June 30 last, but it would not make the slightest difference to our mining operations. The London office, which is a source of expense to the company, is of some service to the English and continental shareholders, and is of great importance to English manufacturers and merchants; but it would be too expensive a luxury to prolong its existence at a cost of over \$482,000 per annum to the shareholders. Considering that America purchases more than half our diamond output, as against one-sixth consumed in England, it would be quite feasible and not bad business for the company to move the London office to New York."

Quicksilver in China

The latest methods of mining and smelting quicksilver ore in Kweichow, China, are described in *Cassier's Magazine* (June, 1907). The principal and most extensively worked deposits in this province are the Wan Shan Chang mines, and according to the best available information they have been worked since about 1358. They are situated in the prefecture of Toon-Yen in the province of Kweichow, about 1324 miles from Shanghai.

Up to about 30 years ago, when gunpowder was introduced into the district, the mode of mining was by hammer and gad, and in the larger workings rock was broken by means of fire. In mining the ore is followed up just as it occurs, with an entire disregard for the most elementary rules of mining, which naturally results in a series of workings intricate and tortuous beyond description. In mining the ore, holes are seldom drilled beyond 15 in. deep, and the drills used are $\frac{3}{4}$ in., with steel points at both ends. The powder used is made at the mine. Owing to the defective mixing of the ingredients of the powder and to the inferior quality of the niter the explosive force is not very great, an average shot breaking roughly 100 to 200 lb. of ore. As soon as a shot is fired the miners rush forward to the face to prevent others from stealing the ore.

The mines may be classed as private mines, acquired and worked by private companies, and public mines, which are worked by individual miners. In a private mine the men are employed on day's wages or on tribute, which means that the company assigns a portion of the mine to one or more men, who supply their own tools, explosives, etc., and are allowed to work without any restrictions, on the understanding that the ore mined is to be retorted in the furnaces of the company, which retains a certain percentage of the quicksilver extracted.

In the retorting furnaces there is a system of holes known as percentage holes so arranged that the amount of quicksilver collected in them is about 20 per cent. of the total, in the case of lean ores, and 40 per cent. in the case of rich ores. All of the quicksilver caught in these holes is the property of the owner of the furnace and is the charge paid by the miner for having the ore smelted. About 50 lb. of ore is charged into the furnace, which is heated with wood fuel. In the case of rich ores the residue withdrawn from the furnace after retorting is ground, sluiced and the concentrate retorted again. The losses are estimated at between 30 and 40 per cent. of the total amount.

Statistics of production are very unreliable, but during the last years the output averaged about 4000 lb. of quicksilver per month. The product is exported from Toon Yen either in pigs' bladders or iron flasks to other parts of China, where it is used for the manufacture of vermilion, for which there is a great demand throughout the Chinese empire.

Mineral Exports of Japan

According to a British consular report considerable progress has been made in methods of sulphur refining in Japan, and the production and exports are increasing. The exports were 22,548 long tons in 1905 and 28,030 tons in 1906.

Increased demand for domestic coal resulted in a decrease in exports, which amounted to 26,534 long tons in 1906. The amount of coal supplied to foreign ships was 95,278 tons in 1906, as against 91,882 tons in 1905.

Manganese is produced in large quantities at the Birika mine in Shiribeshi province, between Hakodate and Otaru. Hitherto the supply has been consumed locally, but in 1906 the output was greatly increased and direct exports were made to Liverpool, New York and Antwerp, amounting to 4817 short tons as compared with 208 tons, the total exports in 1905 which all went to New York.

Ergin is a liquid fuel, which has found much application in Germany. It is obtained from tar by a secret process, and has a heating power of 16,500 B.t.u. per pound.

The Mines of La Luz, Guanajuato, Mexico—II

The Veins Are Stringers Known as "Ramaleos" and the Old Mines Have Produced About Sixty Million Dollars*

BY JOHN A. CHURCH*

VEINS IN THE GRANITE

The length I have given Bolañitos, 7200 ft., is its length in schist only. On reaching the dike, it crosses in a direction slightly more westerly than its normal course and continues in the granite for a further distance of 4000 ft. It has there the same eastern dip. The Burgos is another vein in the granite, nearly parallel to Bolañitos and also dipping East. Its length is 4000 ft. and it does not cross the dike.

The veins in the granite are strong and continuous, but it is said their ore was not equal in richness to that in the schist. As the mines there must have reached the schist in a few yards of depth a comparison between these veins and La Luz, etc., might lead to a determination of their comparative age.

The veins reached the dike at various angles, Bolañitos 27 deg. and Burgos 20 deg. Whether they are faulted by the dike is not known. There has been no opening of wide crevices such as the rubbing action of pressure angular to the dike might produce. The feature of La Luz formation is the *ramaléos*, the coalescence of which has formed the veins and orebodies. In this connection it is interesting to note that the fault vein Bolañitos-La Joya is a bundle of *ramaléos* like all the other veins. This fault has been spoken of so often in connection with the granite that it may be well to emphasize here the fact that South of the dike it is entirely in schist. The granite is in its hanging several hundred feet away. North of the dike it is in granite, but this rock is so shallow there that the vein must enter schist at a small depth.

THE "RAMALEOS."

There have been large stopes in La Luz mines and solid reaches of quartz and calcite 3 to 15 ft. thick and hundreds of feet long. They always run out in *ramaléos* and undoubtedly were formed from them. Neither the word *ramaléos*, meaning a branch, nor the word stringer, which gives an impression of straightness, correctly describes these little veins. They are extremely curved and twisted. They are subject to sudden increases in thickness and often are 2 to 4 ft. thick but probably are short, lacking the continuity needed to make them veins. This disposition to swell probably

indicates solution of the walls. In general the value of the *ramaléos* is less when they are isolated than when they have coalesced into a great vein. They will form a subject of curious study when the mines come under close daily observation.

A PECULIARITY OF LA LUZ MINE

One of the peculiarities of La Luz mine is the existence of stopes in the footwall, which are 10 ft. thick, 100 ft. long and 60 ft. high, which must have been a mass of rather widely separated *ramaléos*. These stopes are the only ones in the mine which are entirely free from waste. Probably the whole mass of rock was taken to the surface, the schist knocked off and the quartz sold. The walls of these stopes still show many *ramaléos*, but the values are low when the whole width is taken. Probably these bodies, which lie 40 or 50 ft. from the vein, were found by following *ramaléos*, but the walls of the crosscut do not show remnants of ore that would tempt a miner. One such stope might be an accident, but there are many of them.

The deposition of gold and silver was very irregular, some of the *ramaléos* being rich and others nearly worthless. They vary from 100 cents a ton to more than 100 dollars. When regular mining permits these deposits to be studied, it may be found that there were two periods of deposition.

La Luz and Purísima have been the two great productive veins of the district, each having many mines on it. La Luz-Refugio group has mined rich ore lately from bodies that were unknown to the old miners, above the 750-ft. level. La Luz vein ends on a line with the dike 1200 ft. distant, which, if prolonged, would cut it off. It is noteworthy that just at that point there is a short vein, called San Bernabé, which runs out from La Luz just in line with the dike, and it dips north like the dike, as Fig. 1 shows.

THE REFUGIO SYNDICATE.

La Luz, Bolañitos and several other veins are owned by a group of Americans who have formed the Refugio Syndicate. They have 7417 ft. on La Luz, covering several mines that had great fame in former times. The San Vicente, Refugio, Santa Clara, San Juan de los Muchachos, La Luz and others are grouped now under one name. They are proposing to build a modern mill on Bolañitos river and to mine extensively. They have a

large amount of old fillings and low-grade ore that experience at Guanajuato shows can be treated with profit and when the old workings are passed there is no doubt they will be in a large and valuable vein.

I have described the vein as an assemblage of small stringers, and it is interesting to note that the effects of this structure are exactly the same as in veins of other types. Fig. 2 is a horizontal section, through stopes in the Refugio mine. It shows two of the large stopes, San Marcos and Carmen, occupying concavities that face to the East and two others, smaller, called Agapito and Santa Clara, lying in concavities that face westward. In Fig. 3 an effort is made to ascertain whether the dip has any influence upon deposition, but the sections show extreme irregularity. The Año Nuevo and Guadalupe stopes indicate that the so called "vein" is really a collection of wide stopes in a line, but without any thing like a connected fracture.

OLD STOPES

Some of these stopes are opened to the surface, but in general the vein is said to be leached for the first 200 ft. from the outcrop. I took pains to ascertain the proportion of stopes to vein area in that part of the workings that has been surveyed, and found that in a length of 700 m., or 2,500 ft., there was 30.6 per cent. of stopes, 26.4 per cent. of leached vein and 43 per cent. of vein that has not been stoped. A considerable part of the latter will yield profitable ore to proper methods of mining and the proportion of stopping ground to barren vein must be considered unusually large.

The old stopes are fallen in and too dangerous to be surveyed, but judging from what could be seen of them they were 10 to 20 ft. thick. One was 425 ft. long and 400 ft. high (vertical, dip being 60 deg). Another 115 ft. long and 375 ft. high and a third 425 ft. long and 165 ft. high. These dimensions show that the mineralizing solutions acted as they always do, concentrating on defined lines, both horizontal and vertical. The "vein" is wide, being often 100 ft., and usually the ore is either on the hanging or foot, but sometimes it cuts across the veins.

The filling is quartz and calcite, the latter perhaps a little the more abundant. Pieces of a carbonaceous slate with quartz veining found on one of the dumps led to an investigation to determine whether the underlying shale had been reached,

*Consulting mining engineer, 15 William street, New York.

but it was found that the schist had been carbonized along some small seams. Whether this action was abundant enough to indicate the character of the vein waters cannot be told now. A cavity of considerable size was found to be encrusted with opaline quartz covered with small quartz crystals on which were myriads of apophyllite crystals.

PRESENT EXPLOITATION

The mines are not wet, the long San Bernabé tunnel (4300 ft.), yielding only 30 gal. a minute at the end of the dry season and 300 gal. at the end of the wet season. These figures throw a humorous light upon the plans of a former tunnel scheme, which was to drain

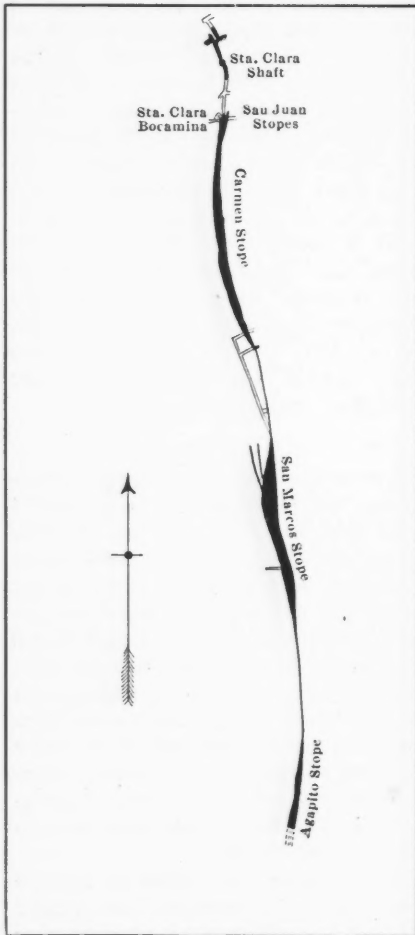


FIG. 2. STOPES IN REFUGIO

the ground under this San Bernabé tunnel by a bore two miles long.

At present, there is one modern plant in the district. It is on La Paz mine, owned by the Amalgamated Gold Mining Company of which Lawrence P. Adams is manager. The workings are said to be 1200 or 1400 ft. deep. The mine is profitable and pays dividends.

The re-opening of these old mines is one of the interesting events of the present day. It has been a privilege to go over Humboldt's work and note the industry and acute observation of that celebrated *savant*. Humboldt was amazed by

the revelation of mining wealth in Mexico. He wrote "The mine of Guanajuato, the richest of all America," and compares it with the production of European mines. He declared that the area which includes San Luis Potosi, Zacatecas, Catorce and Durango, about 200 miles square, was the greatest mining field in the world. La Luz was unknown in his day and with other mines has had a rich production in recent years. The modern exploitation of Guanajuato is proceeding along conservative lines, large amounts of old dumps and fillings being milled, while the mines are prepared gradually for systematic work, and the rich discovery of Pinguico gives hope of finding other bonanzas that the *antiguas* missed.

THE OUTPUT OF LA LUZ.

Whenever a Mexican *antigua* is brought into the market the public is usually informed that it has produced its millions in former times, and the number of millions is given with unstinting generosity. It is common to be informed that a mine never heard of before has produced 10, 30 or 80 millions, and I suppose we have all had the curiosity, though not the time, to add up all these "statistics" to see whether the total would not exceed the whole wealth of the world. In my recent visit to Guanajuato, I had occasion to inquire into the report concerning some of these multi-million mines and I confess to being surprised by the character of the proof adduced.

Humboldt who went through the same experience at the same place, having spent a month at Guanajuato, showed that under Spanish rule there was a system of official records which are trustworthy as *minima* of production. To some extent bullion and rich ore might be conveyed out of the district surreptitiously and thus lower the official record, but otherwise the entire bullion product of each district passed through the local mint and its value through the local tax office, while such part of it as passed out into the great world was recorded in the statistics of exportation.

RECORDS OF FORMER OPERATIONS.

Besides these sources of information the old account books of the mines are preserved by roomfuls and they are very complete and exact to an eighth of a real, i. e. 1.5 cent. The business was managed just as we manage it now, the mine selling its ore to the reduction works, even when both were under the same ownership. For instance, La Luz books which I examined, showed the gross value, mine cost and the profit by difference and the latter was checked by a statement of the dividends paid. In addition there was a column in which the costs and deductions of the *hacienda* were estimated for each lot, and since the rest of the work was done so carefully, I

have no doubt that this estimate was judicious.

In the year 1844, the accounts of La Luz mine sum up (in gold value like all figures presented here).

Divisible profit....	\$ 708,596.92	Div. pd.	\$701,933.92
Mine expenses.....	516,899.03		
Hacienda charges and deductions (est.).....	296,377.00		
			\$1,521,872.95

The only addition I have made to these figures is to add them. In the books the *hacienda* item is entered, but the sheet shows only the mine gross \$1,225,495.95, the expenses and the profit.

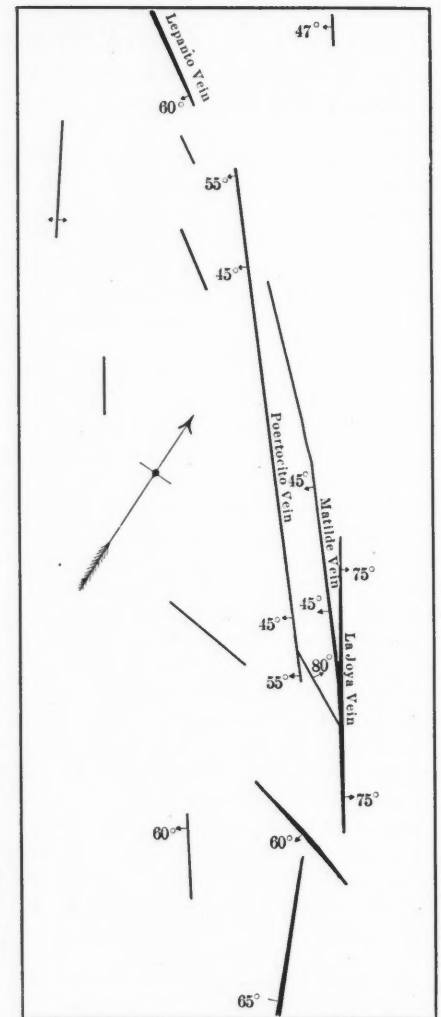


FIG. 3. VEINS OF THE MATILDA GROUP

A Mexican mining engineer of high standing, Pedro L. Monroy, made a study of the Guanajuato district for the Government, covering every possible subject, statistical, geological and historical, and published a book of 675 pages in 1888. He says La Luz mine paid in 14 years, 1843-1856, \$7,016,841.45, and also that the mine produced at least \$40,000,000, and I was curious to trace his reasoning. I found that the mine was worked by lessees who received only 11-24ths, while the owner took 13-24th of the profit. Therefore the read profits were:

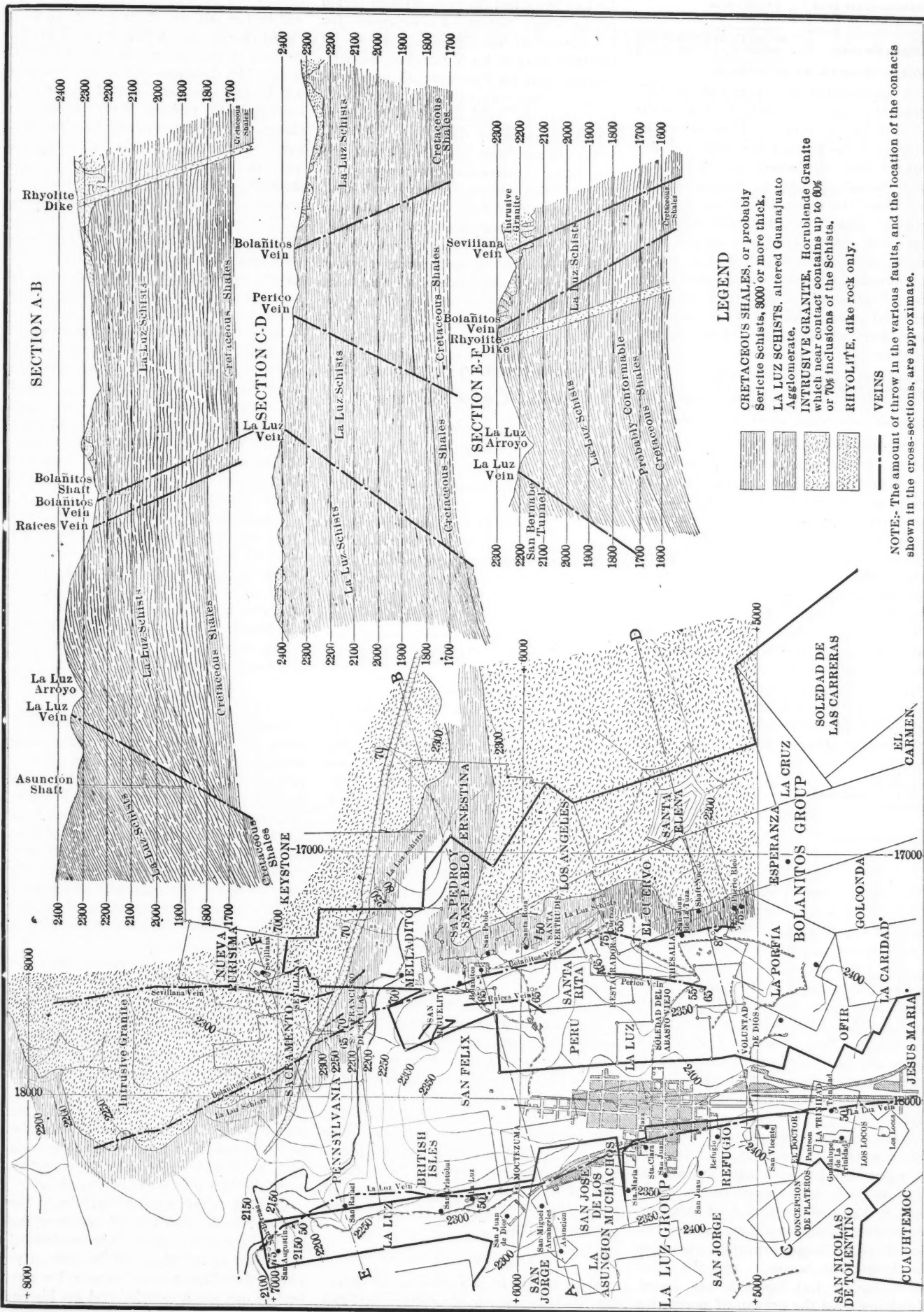


FIG. 1. VEINS AND FORMATIONS OF GUANAJUATO—LA LUZ DISTRICT

Owners share 13/24 ...	\$ 8,292,630.84
Lessees share 11/24....	7,016,841.45
	\$15,309,472.29 Profit 38.27%
Adding for costs.....	24,690,527.71 Costs 61.73%
We have Monroy's est.	\$40,000,000.00

A payment of 38 $\frac{1}{4}$ per cent. in dividends throughout a period of 14 years is certainly a very good record. The average lessee's profit per year was \$1,093,534 and the banner year was 1848, with lessee's profits of \$2,894,424. As my object in going into these statistics was to obtain an irreducible minimum figure of output, I adopted 40 per cent. profit, as a figure which would give a conservative estimate of gross yield in the case of mines whose statistics I could not get and about which I knew only the total dividend payments. There are two of these.

La Luz paid as above...	\$15,309,472.29
San Juan de los Muchachos paid.....	10,078,443.48 Profit 40%
Expenses, both mines....	\$38,081,873.65 Expense 60%
Total production.....	\$63,469,789.42

This is the product from 5120 ft. of La Luz vein divided among the two mines mentioned. Unfortunately the record ends there for Monroy does not even mention the name of Santa Clara, Refugio or San Vicente, three mines which cover 2,297 ft. on the same vein and which have been very productive, nor the product of the Plateros vein. The Purisima, 10,000 ft. long, and many others known to have been in bonanza are also left out of his statistics. As the great bonanza was in La Luz, I will allow these mines only \$40,000,000, though this estimate seems to be low.

I obtained notes of other mines as follows:

Bolañitos.....	\$6,000,000.00
S. S. Pedro and Paulo.....	1,278,498.28
Melladito.....	1,114,856.95
	\$8,393,355.23
La Luz as above.....	63,469,789.42
Other mines.....	40,000,000.00
	\$112,000,000.00

THE TOTAL PRODUCTION OF GUANAJUATO

I do not pretend that this is a fair estimate of the product of this district, but I feel certain that it has output as much as this from the mines in the northern and central portions of the district. Bonanzas have been mined in the southern part also, but I do not know their product, or even their number. The yield of the whole district has been estimated by others at 350 millions and at 200 millions, and I am inclined to think that both are high.

While La Luz has not had the continued activity of its great neighbor, and its reputation has been absorbed in that of Guanajuato as the name of the whole field, it has had its period of splendor. Monroy says that Guanajuato has had two periods of maximum brilliancy, one when the Valenciana bonanza, and the other when the La Luz bonanza was found. He shows what the growth of population was at each period. It is possible that

La Luz furnished the most brilliant period in the whole history of Guanajuato for I imagine that the adjoining mines of La Luz, San Juan de los Muchachos, Refugio, Plateros and La Paz were all in bonanza at one time with a product greater perhaps than the Veta Madre ever had in the same length of time.

The reason why La Luz district did not enjoy continuous prosperity probably was that only one or two small *haciendas* were built there. Most of the ore was sent to Guanajuato, eight miles away and the movement of say 50 tons of ore daily from each of the important mines by burros and mules to that distance was a task that could be supported only by rich ore.

Mexican Smelting Works of the Douglas Copper Company

The smelting works now in process of erection at Fundicion, Sonora, Mexico, by the Compañia Metalurgica y Refinadora del Pacifico, S. A., will be the operating plant in Mexico of the Douglas Copper Company. The plant is situated on the east side of the Cocoraqui drainage, 153 kilometers from Guaymas. A well has been put down on the side of the creek to a depth of 100 ft., in which the company has already encountered an abundant supply of water. The plant will have a capacity of 600 tons.

The power-plant will consist of Morrison suspension firebox boilers of 150 h.p. each, to work under a pressure of 150 lb. The blower engines are tandem-compound, built by the Bates Machine Company, and direct connected to 150 cu.ft. Roots high-pressure blowers. The generators, two in number, were built by the Western Electric Company and are direct connected to vertical cross-compound Bates engines. The current will be direct and of 110 volts for lighting purposes and sundry other uses, and 500 volts for power transmission. The engines will be run condensing. All the machinery throughout the plant, including the pumps, will be motor driven.

The furnaces were built by the Power and Mining Machinery Company and are 44x160 in., with 14-ft. charge column. The settlers are 15 ft. in diameter by 5 ft. deep. The furnaces are connected with the stack by means of 6-ft. steel down-takes into an 11-ft. balloon-shaped steel dust chamber, connected with the stack base. The stack proper is a self-supporting steel structure, having a lower diameter of 12 ft., and an upper diameter of 8 ft. The total height will be 177 ft. above the ground line.

HANDLING THE MATERIAL

Material will be delivered to the charging floor by means of Jeffrey steel-pan roller-bearing elevators, each having a

capacity of 25 tons per hour. The stock will be run into the elevator boots in divisional charge cars, which provide for the delivery of the material in proper proportions. The discharge from these elevators will be into steel bins located one at each end of each furnace, from which the charge will be run directly into the furnace. A thorough mixing of the charge will be secured during the passage through the elevator boots into the charge bins and from there into the furnaces.

The sampling of the ores will be done mechanically. One-tenth of the total tonnage will be cut out mechanically by means of a Vezin automatic sampler mounted on trucks, with a capacity of 30 tons per hour. This one-tenth, which will be the sample proper, will be sent in a narrow-gage car to the sampling works, where it will pass successively through the crushers, rolls and samplers. These latter machines will cut out two equal portions of one-hundredth each, and these two portions will pass through the finishing department of the sampling works as independent samples, and from there go to the laboratory.

The service of the plant throughout will be by means of a 36-in. gage railway; all material will be moved by locomotives, including the slag and matte. The matte ladles will have a capacity each of 10 tons of matte and will be mounted on 36-in. gage trucks. The converter building will be separated from the furnace building by a distance of about 200 ft.

SOURCES OF ORE

The principal source of the ores for this plant will be the properties of the company, all of which are located in the district of Alamos, El Cobre mines being the better known. The company has been developing that property for the past four years. The development work has been extended to a depth of 900 ft. and to a length along the vein of approximately one-half mile. The engineers of the company estimate that the ore developed will be sufficient to keep the plant in operation for five years.

The company has a concession from the government covering the plant and railway, including telegraph and telephone lines between its properties and to the port of Tobarí. At present all freight is being handled by means of Hclt traction engines. Each truck has a capacity of 10 tons of net freight, and the trains consist of from five to six trucks. All of the material for the rock work about the works, amounting to approximately 3000 tons, has been brought in by these engines from the foot hills north of Fundicion.

By Sept. 1 the company will be in the market for the purchase of ores carrying gold, silver and copper. The mechanical equipment of the plant will be such as to enable the shipper to accompany his carload of ore, see it sampled and get his results in from one to three days.

Electric Power at the Calumet & Hecla

High-tension Alternating Current Has Supplanted Steam throughout the Mine and Mill. Complete Equipment Has Just Been Finished

BY CARL L. C. FICHTEL*

In 1900 the Calumet & Hecla Mining Company began remodeling its stamp mills at Lake Linden, and electric power was adopted to drive the Chilean mills, rolls, jigs, etc. Motors of 440-volt, 3-phase, 25-cycle type were decided upon and this necessitated the erection of a power plant. The only available current at that time was from a small lighting plant generating single-phase, 125 cycle. The first two units of the present plant were installed consisting of two 1000-kw. generators of the revolving field type, generating at 440 volts. One of these is connected direct to an Allis-Chalmers vertical tandem-compound engine; the other is driven by a rope-drive connected to a remodeled hoisting engine, which runs at 50 r.p.m. The size of the driving pulley is 32 ft. and the driven pulley, attached to the generator, is 11 ft. 6 in. Attached to the generator shaft is the revolving part of the exciter for this unit. Located in this part are also a steam-engine exciter and a motor-driven exciter, together with the switching apparatus; this completed the plant which generates and transmits power at 440 volts direct to the various mill buildings located in close proximity to the power plant. Steam was furnished the plant from a large central boiler plant about 100 ft. away.

THE CHANGE TO ELECTRICITY

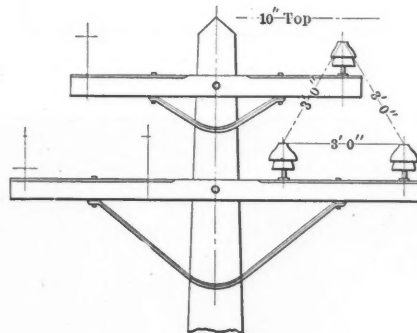
The adoption of electrical power to replace all small steam engines at the mine, thus eliminating the loss of steam through condensation in long pipe lines, necessitated the enlargement of the plant; consequently an addition was built to the original plant.

In this addition are installed and in operation two new units, and a third is being rapidly assembled. These electrical units are similar to the two previously installed, but are of 2000 kw. capacity each and generate at 13,200 volts. They were built by the General Electric Company, of Schenectady, N. Y. They are direct connected to a marine-type engine having a 24-in. high-pressure and two 40-in. low-pressure cylinders working on a 48-in. stroke. These engines were originally built for hoisting purposes by the I. P. Morris Company, but were never used. An extended shaft, with a fly-wheel attached, was fitted to these engines and on it the generator field was placed between the fly-wheel and an outboard bearing.

*Electrical department, Calumet & Hecla mine, Calumet, Michigan.

All the generators are built for parallel operation, a bank of transformers being placed between the old 440-volt side and the new 13,200-volt side for either stepping the voltage up or down as the case may be. On the high-tension side, besides the generators and transformers, are two motor-driven exciters of 600 amperes and 125 volts, built by the Bullock Electric Company, and one General Electric Company's motor-generator set of 250 kw. capacity, generating at 2200 volts, 60 cycles for lighting purposes. The transformers are air cooled and have 370 kw. capacity each; they were furnished by the Wagner Electric Company. Two ventilating fans force the air through them.

The bus-bar compartment is built beneath the generator floor. The buses are controlled by automatic oil switches placed on the generating floor and under



POLES USED IN TRANSMISSION LINE

the switchboard gallery. These are enclosed by brick encasement and operated by motors.

SWITCHBOARD

The switchboards on both the 440- and 13,200-volt sides are black enameled slate, furnished by the General Electric Company. The 440-volt board contains two generators, two exciter and six feeder panels. The generator panels are equipped with ammeter, voltmeter, indicating and recording wattmeters. The exciter panels, ammeter and voltmeter and the feed panels have ammeters on the face of the board and recording wattmeters on the back.

The high-tension board is similar to the 440-volt board in construction; it is made up of two generator panels; and mounted on each are ammeter, voltmeter, power-factor indicator and recording wattmeter, two feeder panels with ammeter and voltmeter, two blank panels, one transformer

panel and one tie-panel connecting the two boards.

There are also the two exciter panels, motor and generator panels, four feeder panels and two panels for constant-current transformers for arc lighting. The feeder panels each contain three ammeters for registering the current on each leg of the three-phase system. The arc-lighting panels contain ammeter and recording wattmeter. Lighting arresters, and reverse-current relays protect from lightning and excessive over-loads, etc.

TRANSMISSION LINE

Current is transmitted, from the power plant at Lake Linden to a substation at Calumet, a distance of five miles, at 13,200 volts pressure. Two complete and independent lines are erected of cedar poles, having 9-in. top and placed 7 ft. in the ground; each line is built to carry two complete circuits, only one on each line being installed at the present time. There are three stranded copper wires to a circuit, each being 350,000 cir. mils., supported by porcelain insulators of the Niagara type; 2 1/4-in. locust pins are used. Two 5x6-in. Georgia pine cross-arms are placed on a pole, the top one being 7 ft. long, the bottom one, placed 24 in. below, is 10 ft. long; an equilateral triangle is formed by the wires which are 36 in. on a side. This is shown in the illustration.

This form of construction is carried on throughout, the poles being placed 100 ft. apart and of suitable length to conform to grade. Double-pole construction is used when crossing railroads or other lines, and a four-pole tower with strain insulators is placed at right-angle turns.

SUBSTATION

The current on entering the substation passes through disconnecting switches, oil switches and through the transformers where it is stepped down to 2300 volts for distribution. The substation contains two banks of air-cooled transformers of 500 kw. capacity each; two blower sets furnish the ventilating through openings in the cement floor; the basement of the building is absolutely air-tight and is used as an air reservoir for this purpose.

There are also in this station two 350-kw. motor-generator sets for lighting purposes; these consist of a 350-kw., 60-cycle, three-phase, 2200-volt generator and a 510-h.p., 25-cycle, three-phase, 2300-volt induction motor, together with their exciter. These are mounted on a common bed-plate, and all the revolving parts are on one shaft. These were furnished by the

Westinghouse Electric and Manufacturing Company.

There are two separate switchboards, one containing the incoming high-tension feeders and outgoing 2300-volt, 25-cycle power circuits, the other being used for lighting purposes entirely.

The power board is composed of two incoming high-tension feeder, two transformer- and eight outgoing 2300-volt feeder panels. This board is equipped

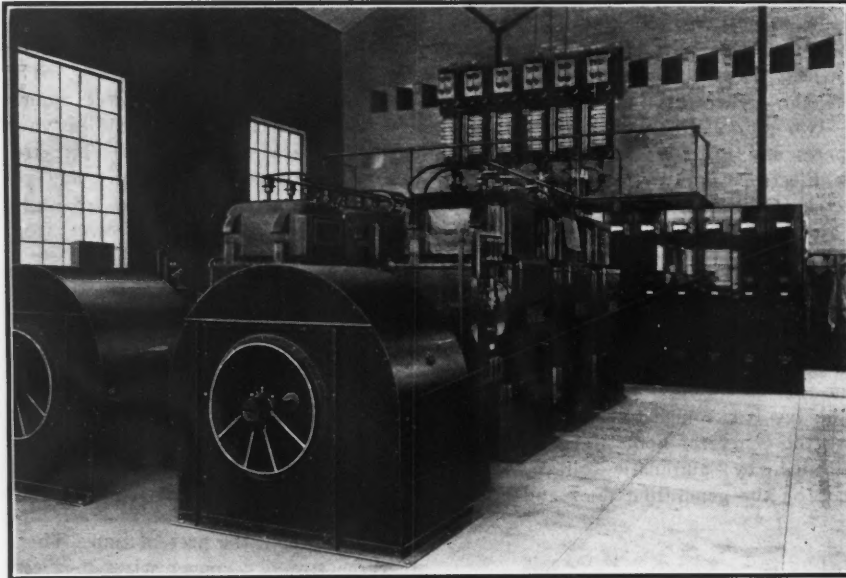
volt induction motors are used entirely; they are belted to Chilean mills, and drive the shafting which operates the jigs, rolls, Wilfley tables, etc.; they range in size from 20 to 50 h.p. and are about 40 in number. There is also a 700-h.p. induction motor geared to a 60-ft. sand-wheel. This wheel is used to elevate water and sand, as it passes out from the mills.

At the mine 2300-volt motors are used in all rock houses, shops, etc., where pre-

cranes, of which there are several. Electric lights are placed on the man cages, and are lighted by means of storage batteries

The mine maintains a complete Gamewell fire-alarm system, and its hospital is equipped with a fine X-ray and therapeutic outfit, which receives direct current from a small motor-generator operated from the lighting circuit.

Storage batteries, which furnish current for assaying purposes, are charged by means of a mercury-arc rectifier. In short nearly everything electrical, excepting "wireless," is to be found in this complete equipment.



520-KW. TRANSFORMER POWER BOARD AND FEEDERS IN SUBSTATION

with two separated sets of buses, automatic oil switches and reverse-current relays. The two incoming feeder panels are equipped with two ammeters and a voltmeter; the transformer and outgoing feeder panels each contain an ammeter.

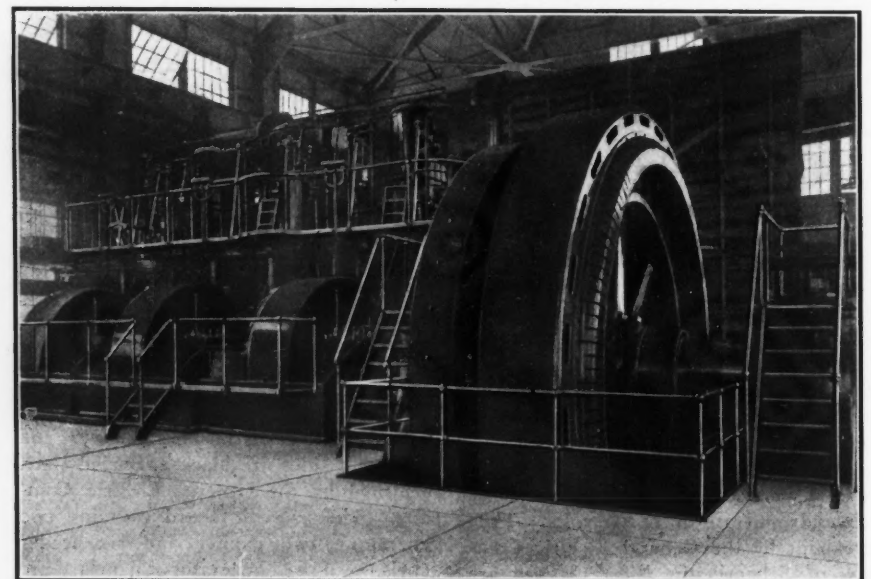
The lighting board is composed of two motor-, two generator- and exciter-panels, twin feeder and two constant-current transformer panels. The induction-motor panels have mounted thereon one ammeter, oil switch, time-limit relays for overload protection and the lever of the starting device, which is located in the basement.

The generator panels have an A. C. ammeter, indicating wattmeter, voltmeter, and direct-current ammeter for field excitation, and time-limit relay. Recording wattmeters are placed on the back of the board. Rheostats, for controlling the exciting current, are placed in the basement and are operated by a sprocket and chain from the board.

The feeder panels each contain three ammeters for registering the current on each leg of the three-phase system. Each board is made of black enameled slate and is mounted on angle-iron frame-work. They were furnished by the General Electric Company.

VARIOUS USES OF ELECTRICITY

At Lake Linden, where are located the large stamp-mills of this company, 440-



MARINE-TYPE ENGINE DIRECT CONNECTED TO 2000-KW. GENERAL ELECTRIC GENERATOR

viously small engines were used. For these purposes, there are installed 27-h.p. and three 100-h.p. motors. Underground pumping is done electrically. Four 110-h.p. motors are geared to reciprocating pumps, these being 440-volt type. Current is transmitted underground at 2300 volts, and a set of transformers at the pumping stations cuts it down to 440 volts; 440-volt motors are used throughout for the

pass, is called the magnetic field. The intensity of the magnetic field depends upon the size of the magnet, the form of the magnet, and the number of ampere turns in the coil, i.e., the product of the amperes of current flowing in the coil times the number of turns around the core. The attraction of any magnetic substance varies with the intensity of the magnet and its distance from the magnet.

The Russian Iron Industry

Consul Alexander Heingartner writes from Riga that notwithstanding the depression in the Russian iron industry the extraction of the southern hematite ores continues to increase. This is due to the rapid growth in the export of these ores to Silesia and Westphalia, which rose from 220,000 tons in 1905, to 460,000 tons in 1906, or about 10 per cent of the output in the latter year. In view of the small available quantity of these ores, estimated at only 66,000,000 tons, this increase in the export is causing some anxiety to the local mill owners, as the other ores of the district are of poorer quality and less importance, the output having decreased from 180,000 tons in 1899 to 28,000 tons in 1906. The peninsula of Kertch, on the other hand, possesses valuable deposits of iron ore, estimated at 466,000,000 tons, but owing to the backward condition of the industry in this region the yearly amount of ore smelted is not above 250,000 tons.

The mines of the Ural, where the largest deposits of iron ore are to be found in the Empire, have been forced to restrict their output. It is hoped to extend the market for these ores to the south, and by a reduction in freight rates and a more thorough utilizing of the inland waterways, to lay down the ore at the Don foundries for about \$3.84 per ton, a price only slightly higher than the local hematite ores. If the south can obtain the Ural ores at that figure the future of its iron industry is assured, and the local mill owners can view the export of their hematite ores to Germany with indifference.

PRODUCTION OF PIG IRON

In the manufacture of pig iron there has been since 1900 a certain displacement in the local production, as appears from the following table:

District.	1900.	1905.	Capacity of Wks.
	Tons.	Tons.	
South Russia.....	1,477,600	1,656,800	2,730,000
Ural.....	811,000	660,000	996,000
Central Russia.....	230,000	84,375	385,000
North Russia.....	35,680	12,700	56,250
Poland.....	293,460	246,700	562,500
Total.....	2,847,740	2,660,575	4,729,750

The overproduction of 1900 and an only slightly smaller output in the following year caused a large accumulation of stocks, which were disposed of only by a great curtailment of production during subsequent years and a reduction in price. Their favorable situation, with regard to the principal markets, their use of coke as fuel, and the introduction of important technical improvements have enabled the South Russian iron mills since 1904 not only to return to the level of the production of 1900, but also, owing to the high tariff on the foreign article (\$14.40 per ton for ordinary brands, \$24 per ton for special), to extend their markets to the north and northwest.

The capacity of the Russian furnaces is much larger than the present output and the limit will not have been reached, even should the per capita consumption of iron in Russia increase to that of Austria or Sweden.

The prices of pig iron at the most important markets of south and north Russia for the years 1904-6 were about equivalent to the prices abroad. With a reduction of \$1.60 per ton in the present cost of production (about \$12.50 to \$12.80 per ton), which is considered possible with a more up-to-date equipment of the mills and improved processes in manufacture, it is expected that Russian pig iron will soon become an article of export.

MANUFACTURE OF IRON AND STEEL PRODUCTS

Rails are manufactured in four districts, the South leading with a production in 1905 of 290,000 tons out of a total of 373,180 tons. With pig iron costing \$12.50 per ton, the cost of production in the more modern mills is about \$19.85 to \$20.85; in the others about \$24.40. In the smaller rolling mills of the Ural the cost approximates \$27.25, owing to the large amount of manual labor employed in manufacture and the greater quantity of raw material used.

As the yearly requirements of the Russian railroads, with a length of 60,000 versts (40,000 miles), are about 257,140 tons of rails, and the capacity of the mills 707,140 tons, not only can Russia supply its own home demand, but also furnish a large quantity for export. To gain the foreign markets, however, the mills will have to reduce the price at least \$1.90 per ton below that of the international rail syndicate. Of structural shapes of all kinds there were produced in 1905 1,176,000 tons, the bulk of the production, or two-thirds, falling to the south. Of iron and steel plates and sheets, the south is the largest producer, with an output of 126,640 tons out of a total of 230,460 tons. The capacity of the mills is 530,350 tons, exclusive of roofing plates. The demand for boiler plates exceeds the supply, and a small quantity, 8840 tons, was imported in 1905.

Roofing plates are also manufactured in all districts, although the Ural is the largest producer, with an output of 175,180 tons out of a total of 213,260 tons. Formerly the Ural had a monopoly of this manufacture, supplying even foreign markets with the article, and should the Russian mills modernize their processes a revival of this export trade is considered possible. The district still holds a dominant position in the Russian markets owing to the uniformly fine quality of the plates, charcoal iron alone being used in manufacture.

WROUGHT IRON

The general decline in the consumption of iron has also necessitated a curtail-

ment in the production of wrought iron, estimated for 1906 at 15 per cent. The causes that have led to the decline being still in force, relief can only be looked for in an export of the surplus products, which in view of the increased European requirements appears now possible.

The important question remains whether the Russian mills are technically so well equipped as to be able without loss to supply the foreign demand. This can be unhesitatingly affirmed in view of the fact that Russian iron products are sold at home at equal and in many cases lower prices than the foreign article. For the realization of an export, which in view of the present condition of the industry is becoming a necessity, certain reforms have to be effected, among which are lower freight rates, in view of the enormous distances of the iron centers from the European markets, and an organization of the industry for export purposes and the creation of a staff of special agents and travelers.

PIG IRON FOR ARGENTINA

The sale by a south Russian mill of 8000 tons of pig iron to Argentina at a price of \$14.40 per ton at mill, or \$20.50 delivered, and the decision of the ministry of finance at a meeting on railroad tariffs to reduce, in the interests of the domestic industry, the rates on the state railroads on iron and steel products were two events that occurred recently.

Novel Use for Discarded Hoist Engine

At the north shaft of El Oro mine, Mexico, the steam cylinders of the hoist, which is now operated by electric current, are used for speed regulation in a novel way. All machinery at the mine and cyanide plant was recently equipped with Westinghouse motors for the use of current brought from the power plant at Necaxa, 171 miles distant, and among the numerous steam motors superseded was the engine of this shaft used chiefly for raising and lowering men and timber. The new motor is a 120-h.p. variable-speed induction unit coupled directly to the pinion shaft of the hoist. In lowering a cage down the shaft the pistons of the old engine are made to compress air in the cylinders so that by opening or closing a valve fine speed regulation can be obtained.

Not only has the use of steel largely increased in the manufacture of conveyer chains, but steel elevator buckets are used much more extensively than heretofore. They possess distinct advantages over malleable buckets in many ways. They are more durable, less liable to break, and can be made in a variety of shapes and sizes that would not be possible in malleable iron.

Electrolytic Production of Copper from Ore at Medzianka, Poland*

BY W. STOEGER

Medzianka is an old copper-mining locality about 55 miles north of Cracow, and 140 miles east of Breslau, which, although formerly of considerable importance, had been abandoned for nearly a century. Recent explorations by Laszczynski Brothers led to the discovery of a belt of ore-bearing limestone about $1\frac{1}{4}$ miles long and 150 ft. broad, containing copper ore interspersed in strips $\frac{1}{2}$ to 1 in. thick with calcspar and some quartz. The mineral is almost entirely copper glance. The deposit has been proved to about 150 ft. in depth.

The produce of the mine is divided into rich ore with 50 per cent. of copper, which is separated underground, and mixed ore with 16 to 20 per cent. containing calcite and pieces of limestone, which is improved by hand-picking at the surface. The ore as brought from the mine is crushed by rolls, mixed with 5 per cent. of damp brick earth and molded into blocks, which, when dried by the waste heat of the furnace, are subjected to a partial roasting in a low kiln fired from the outside, with a free access of air, which converts the copper into sulphate and oxide.

The roasted ore is crushed fine and lixiviated in lead-lined tanks, with the spent liquor of the electrolytic baths containing about 5 per cent. of free sulphuric acid. A liquor containing about 5 per cent. of copper and 1 per cent. of free sulphuric acid is obtained. After passage through a filter press, this is electrolyzed in vats of about 35 cu.ft. capacity. Insoluble anodes of lead plates in cloth bags, and thin copper cathodes are used. A current of 1000 amperes at 2.5 volts, corresponding to a density of about one ampere per square decimeter of cathode surface, is used, producing metallic copper, free sulphuric acid and oxygen. The deposited copper, about 1.1 gram per ampere-hour, is nearly equal to the theoretical amount. The power consumed per kilogram of copper is 2.28 kw.-hours or $3\frac{1}{2}$ -h.p. hours. The liquor is exhausted in about 35 hours, when it is returned to the extraction vats for the treatment of fresh ore. The cathodes remain in the bath for about a month, when the deposit (1 to $1\frac{1}{4}$ in. thick) is removed and sold. It is of greater purity than ordinary electrolytic refined copper. The four baths at present in use are served by a Siemens dynamo of 1000 amperes at 12 volts output. The whole process is so simple that the entire plant is supervised by a single man in the mill, without any other trained

assistance. A similar plant is now under construction in central Asia.

A Brazilian Geological Survey

The Republic of Brazil recently created a geological survey, and Prof. Orville A. Derby was appointed chief of the service, with the following assistants: Dr. Miguel Arrojado R. Lisboa, to have charge of the investigation of the gold, iron and manganese deposits in the State of Minas; Dr. Luiz Filipe Gonzaga de Campos, who will probably undertake geological studies on the Rio Purus in the Estado do Amazonas; Dr. Francisco de Paula Oliveira, who will proceed with his studies of the coal deposits of Santa Catharina and Rio Grande do Sul.

Professor Derby, the chief of the service, is a native of the State of New York, having been born at Kelloggsville in 1851. He entered Cornell University in 1869, graduated in 1873, and took his master's degree in 1874. He accompanied Professor Hartt to Brazil in 1870, 1871, and again in 1872. In 1874 Professor Hartt went to Brazil, leaving Mr. Derby as assistant in charge of the department of geology at Cornell. A geological survey of Brazil (Commissao Geologica do Brazil) was inaugurated in 1875 with Professor Hartt as chief, and on this Mr. Derby was appointed assistant geologist. He reached Rio de Janeiro in 1875, and he has lived in Brazil ever since. He was connected with the geological commission as long as it lasted; upon its suspension and after the death of Professor Hartt he was appointed director of the geological section of the national museum in Rio de Janeiro. In 1886 he was made director of the geological and geographical survey of the State of Sao Paulo, a position which he retained until 1905, when he resigned.

Among the authorities upon Brazilian geology Professor Derby is at the head. His papers on the subject number something over one hundred, and other writers upon Brazilian geology have also drawn largely upon his rich store of information. In addition to his own direct contributions he has been instrumental in securing the coöperation of many of the best specialists in the world to work up and describe special collections. For example, the "Cretaceous Paleontology" of Brazil, by Dr. C. A. White, and the "Paleozoic Faunas of Pará," by Dr. John M. Clarke, are monumental contributions to the geology of Brazil that were made possible by Mr. Derby's efforts and coöperation. The well-known writings upon Brazilian mineralogy and petrography by Dr. E. Hussak were also made possible by Professor Derby's appointment of that able geologist to a position on the Sao Paulo survey. Among Mr. Derby's most noteworthy direct con-

tributions to geological literature are his papers on the origin of diamonds, on the nephelene rocks of Brazil, and on the geology of the lower Amazonas.

Cyanide Process Replaces the Patio in Pachuca

The patio process is giving way to the more modern cyanide process even in its birthplace, the historic camp of Pachuca, Hidalgo, Mexico. The Real del Monte Company, a subsidiary corporation of the United States Mining, Smelting and Refining Company, has two large cyanide mills in course of erection, and since experiments have proved the success of cyanide treatment of Pachuca ores other mining companies are adopting the process.

One of the oldest of the patio haciendas has the honor of being the pioneer operator of the camp to use the cyanide process. The Compania Beneficiadora de Metales, Hacienda de San Francisco No. 1, after an idleness of about six years, started in with its changes last year, and now has for several months had in successful operation a model concentration and cyanide plant. The method of handling the ores from the mines is roughly as follows:

The product of La Luz mine is brought by rail to the mill and thrown upon two grizzlies with 25-mm. spaces, passing thence to a Dodge crusher and on to thirty 1000-lb. stamps, dropping 90 to 100 times a minute in solution. The material passes through a 20-mesh screen to Wilfley tables, and the tailings to separators. The fines go to the tanks and the coarse to ball mills to be ground to 100 mesh. The tanks are of a special design, the invention of Albert Grothe, known as the "Pachuca tank," and are agitated by compressed air. From the tanks the material goes to Butters filter presses.

Influenced by the success of this plant the stockholders of La Union Hacienda, another of the old patio plants, at the suggestion of Francisco Narvaez, managing director of the company, decided on the installation of the cyanide process and orders for the change have been given. The two plants of the Real del Monte Company are both of 180 tons capacity, so planned that they can be doubled with little difficulty. Both are expected to be in operation by August. Here also fine grinding has been found necessary and Butters filters will be used.

The introduction of the cyanide process in Pachuca means not only that much lower grade ore may be handled than before, but also that the greater part of all the old dumps, the accumulations of centuries, will be reworked.

The spectrum of the light coming from the mercury vapor lamp contains all the prismatic colors except red.

*Abstract of an article in *Oest. Zeit. f. B. u. H.*, 1906, p. 387.

The Zinc Smelting Works of Swansea, Wales

Six Smelters Produce about 450 Tons a Week, Mostly from Custom Ores and Partly from Ores Imported from Italy and Africa

BY EDWARD WALKER

Though the force of circumstances has deposed Swansea from its influence in the copper world, the district still holds its own in the metallurgy of zinc, and this in spite of the keen competition of the Bel-

ZINC-SMELTING WORKS

There are six zinc-smelting works in South Wales, all in the Swansea district. The largest are the works of Vivian & Sons, at Morriston, the English Crown

Bank plant belonging to Williams, Foster & Co., produces 60 tons a week, and the extension now building will shortly raise the output to 120 tons a week. These works used to belong to the Grenfells, but the business was some years ago amalgamated with Williams, Foster & Co. The amalgamated firm bears the name of Williams, Foster & Co., and Pascoe Grenfell & Sons, Limited, and owns the copper and zinc works, formerly carried on separately. There are also two smaller zinc producers, viz., the Villiers Spelter Company and the Swansea Vale Spelter Company, which produce about 30 tons a week each.

Of these companies only the English Crown Spelter Company has a mine of its own; this is situated in Italy, and produces calamine of fair grade, also blende. The company depends on its mine for about half of its supply of ore, and the rest of the ore treated consists of calamine, blende, zinc ashes, etc., bought in the open market. Vivians has certain interests in mines in the north of Africa, but otherwise the whole of the output in Swansea comes from custom ores.

There is no production of zinc from ores in any other district of Great Britain, though there are smelters in Bristol, Liv-



CHARGING THE RETORTS

gian and German smelters who are far more favorably situated with regard to the supply of ores. There is only a small production of zinc ores in Great Britain, and curiously enough a good deal of it is mined by foreign companies and exported to Belgium. The output of the Swansea smelters is about 30,000 tons of spelter per year. The amount of spelter and manufactured zinc, not including zinc oxide, imported into Great Britain from Europe and America, is about four times that figure. It will be seen therefore that the Swansea smelters have to exercise all their ingenuity in business matters and technology in order to maintain their position. They never had any such monopoly as was enjoyed by the copper smelters, so that their business has been built up in keen competition with other parts of the world. Ten or 15 years ago, when zinc was low in price, the sources of supply were not abundant, but since the rise in price, the available ores have increased, and the smelters can get all they want. In fact, the conditions are so satisfactory that increases in plant are in hand or in contemplation. Zinc ores, with any considerable contents of lead, are not smelted in Swansea, and the purchase of Broken Hill concentrates is not even thought of.



RETORTS IMMEDIATELY AFTER CHARGING

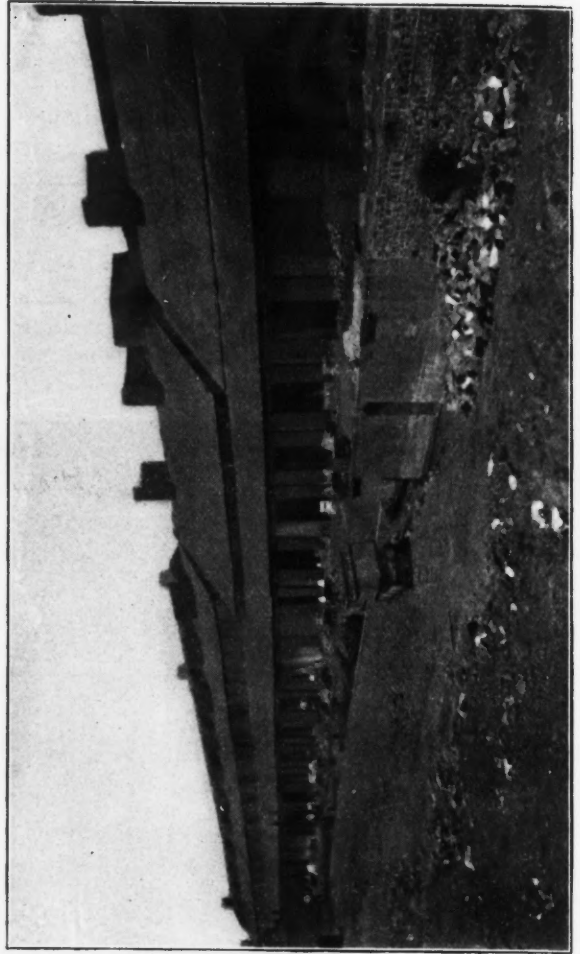
Spelter Company's works, at Port Tennant, and Dillwyn & Company's works, at Llansamlet. The first-named produces about 180 tons a week, and the other two about 150 tons a week each. The Upper

erpool and Glasgow, where galvanizers' waste is dealt with.

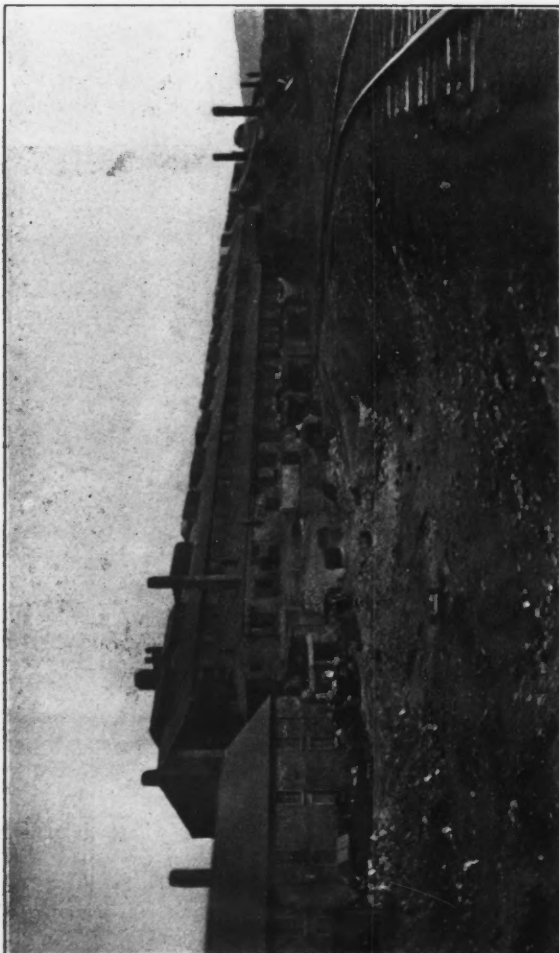
A plant is being built by the Central Zinc Company, at West Hartlepool, at the mouth of the Tees, in the north of Eng-



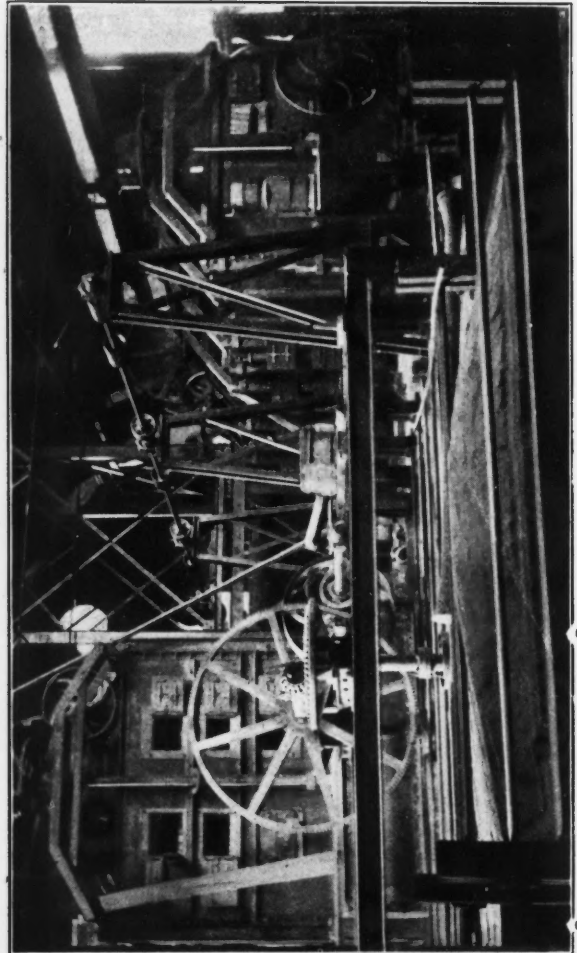
KILNS FOR HEATING. NEW RETORTS ARE SHOWN ON THE LEFT



FURNACE HOUSE—DISCHARGING REFUSE FROM RETORTS INTO CARS



FURNACE HOUSE, ENGLISH CROWN SPELTER COMPANY



MERTON ROASTING FURNACES IN PROCESS OF ERECTION

land, for the purpose of smelting the zinc concentrates obtained by the flotation process of the Central mine, at Broken Hill, belonging to the Sulphide Corporation, and it will probably be in working order by the end of the current year. In the meantime experimental work is being carried on at a small works, near Swansea. There is some expectation of the Zinc Corporation commencing similar works at the old Rio Tinto plant, at Cwmavon, but as the corporation has got itself into a tangle for the time being, the smelting plans are at present in abeyance.

METALLURGICAL PRACTICE

At the present time the gas-fired Belgian furnace is in use at the four principal works. Previously, coal-fired Belgian furnaces had been in use in some works, and coal-fired Silesian furnaces in others. The change to the modern furnace took place at different times, from 10 to 20 years ago.

The works of the English Crown Spelter Company are typical of the present Welsh practice, and I give herewith a number of views of the works, distilling furnaces, and roasting furnaces. At the English Crown Spelter works there are 14 furnaces in all, of which 13 is the average number in use throughout the year. Each furnace consists of 154 retorts, half on one side and half on the other. There are only two tiers, additional rows not being encouraged owing to difficulties in charging and tapping when the tiers are so high up. The furnaces are of the Siemens regenerative type. The dimensions of the retorts are, length about 5 ft., internal diameters $11 \times 7\frac{1}{2}$ in., and thickness of walls 1 in. The clay used is a mixture of Belgian clay and burnt Stourbridge clay. At the present time the retorts are made by hand, but a hydraulic press, made by Mehler, of Aachen, is in course of erection. A similar press was erected at the Upper Bank works of Williams, Foster & Co., a few months ago, and is now in active operation. It is expected that owing to the denser structure of machine-made retorts, their life will be much greater than the hand-made retorts which are more or less porous. After manufacture the retorts are allowed to dry at the ordinary temperature for six weeks, and subsequently at gradually increased temperatures in drying houses for another six weeks. After being placed in the furnace the life of the hand-made retort is about two months.

The smelting mixture consists largely of calcined calamine, with which is mixed roasted blende, and galvanizers' waste and flue dust, and also blue powder, oxide, etc., from previous charges. The reducing agent used is anthracite from the local coalfields. The retorts are charged in the morning from 8 to 11 o'clock, and the first tapping of zinc takes place at 3 or 4 o'clock in the afternoon. Two subsequent tappings take place at further intervals of six hours. When the morning shift begins the work at 6 o'clock the next

day the retorts are cleared out and prepared for the next charge. The condensers attached to the end of the retorts are made of cheap local clay, and after a time are ground up and mixed with the smelting charge to recover the metal absorbed by them. The prolong attached to the end of the clay pipe is made of ordinary sheet iron.

The calcining of the calamine is done in hand furnaces, and until recently the roasting of the blende was effected in the same way. At the present time Merton furnaces are being introduced in most of the works, and considerable economy in labor and fuel is being effected. The last unit or so of sulphur is not removed owing to the considerable expense of so doing. The view shows a five-tier and a three-tier furnace operated by the same driving gear. The blende is first dried in a straight-line furnace, is then passed through a ball mill, and then distributed to the Merton furnaces.

The recovery of zinc averages 86 to 90 per cent., according to the quality of ore used; about a quarter of the loss is in the residues. It is very seldom that ores containing more than 2 per cent. of lead are used.

At the English Crown Spelter works it is not considered necessary to ignite the carbonic oxide coming away from the retorts, and in the illustration it will be seen that the gases are not burning. The works stand on the seashore and are isolated, so that there is plenty of fresh air to dilute the effluents. At the other works, which are situated in the closed-in valley behind Swansea, the gases are always burnt, and in addition hoods are built over each furnace to carry gases, fumes, etc., upward out of the working space as quickly as possible.

In the above outline of present Welsh zinc practice, I have not been able to give exact analyses of the ores, the constitution of the charges, or the working costs. The strenuousness of the conditions under which the smelters have to work makes the publication of such details inadvisable.

Engine Planes in the Anthracite Field

Engine planes are of many kinds; some have engines at the head and haul the loaded trips up, the empty cars being run down by gravity, while others have an engine at the head and haul the empty trips up, allowing the loaded cars to run down by gravity. There also are those systems where the engines are located at the foot of the plane, and haul the loaded trips up the plane, permitting the empty cars to run down by gravity. The disadvantage in the last method is that the length of rope and number of rollers are double besides necessitating a sheave wheel at the head. Also the cost of the installation is greater together with

its maintenance. The arrangement of tracks at the head and foot of such planes is similar to those in the gravity planes.

In hauling cars from the faces of workings to the foot of a shaft, there are two distinct stages in which the loaded cars are brought to the shaft; first, collecting the loaded cars from the working faces to a point from which the general haulage begins; second, from the latter station to the foot of the shaft either by motor, tail-rope, endless-rope or otherwise. The gathering up of the loaded cars, and distributing the empty cars to and from the general station or branch is done by animal power, and this part of the haulage road is made as short as practicable, as mule haulage is more expensive (average mule power per hour is 15c.) than mechanical haulage. There are many different kinds of haulage used in the anthracite field; but the most common types are those of the tail-rope system where the character of the gradient is more or less irregular and there is the impossibility of grading the road. Motor systems of haulage, both compressed air and electric, are used where the grade of the road is more or less uniform, and less than 3 per cent. (generally in favor of load). Usually 40-lb. rails are used in all the mechanical-haulage systems.

Under ordinary conditions, considering delays at turnouts, etc., the average daily work done by a mule underground is about 50 per cent. of the ordinary work done outside. An average mule hauls 25 net ton-miles per day; the average cost of a mule per day is \$1.20, so that the cost per ton-mile for average mule haulage is about 4.80c. The cost per ton-mile of mechanical haulages varies, but the fair average is from $\frac{7}{8}$ to $1\frac{5}{8}$ c. for compressed air haulage; 2 to $2\frac{1}{2}$ c. for tail-rope and 2 to $3\frac{1}{2}$ c. for electric haulage.

Coal in Borneo

An article in the *Australian Mining Standard* gives an account of the discovery of coal in the island of Borneo. Coal measures, which are reported to be very extensive, have been found on the Brunai river in the northeast province of the island, where facilities for working are such as to permit of coal being marketed at a very low cost. The river, which is a deep, broad and navigable stream, runs past the outcrop and sea-going vessels are able to anchor very near to the mouth of the tunnel. In the early part of 1906 a shipment of 1500 tons was made to Hongkong, where there is said to be a market for practically all the coal that can be produced.

Capital for exploiting the deposits has been furnished by Hongkong investors, who have secured concessions which include 10 seams of bituminous coal of various thicknesses, the work now being carried on in a seam $18\frac{1}{4}$ ft. thick.

Determining Volumes of Coal in Bins and Piles

Methods and Formulas for Finding the Dimensions of Masses of Different Forms Either Intact or Partly Tapped

BY CHARLES ENZIAN*

The term "coal" should not be taken literally as the methods recited may be employed for any granular material which upon freely depositing will assume some uniform slope; or expressed in another way, becomes stationary at a definite angle with the horizontal known as "the angle of repose."

During the past few years the question of storing coal has become a vital one, and

the area of the base may be computed, and applying the formula:

$$Vol C = \frac{1}{3} h \times \text{area of base.}$$

These operations involve cubical or conical principles—familiar to every reader.

It is universally understood that granular material, if delivered from a fixed or variable point always at the intersection of the slopes of the pile, will form a right cone, if its base (or receiving floor) is horizontal. If the base is not horizontal, the pile will always contain the properties of conical sections, the applied principles of which will give good results. I have had occasion to make these estimates and from "check piles" obtained results within 0.1 per cent. error, which is considered good, owing to the multiplicity of varied conditions entering into calculations of this character; such as mixing coal from different localities, of different specific gravities; percentage of moisture; reduction of size, etc.

The first step in making an estimate of material in bins or piles should be to determine its specific gravity. Coal will

If properly constructed, space being available, the slopes on bottoms *CD* and *DE*, will be very nearly the angle of repose, 27 deg. for anthracite.

When discharging from the chute *A* the "natural line of fill" will be *AF*, the line of repose.

By handling, the bin may be filled to line *AB*. This, however, may become an expensive operation when the distance *AB* is greater than 30 ft., requiring then more than one handling with the shovel.

Assuming that the bin had originally

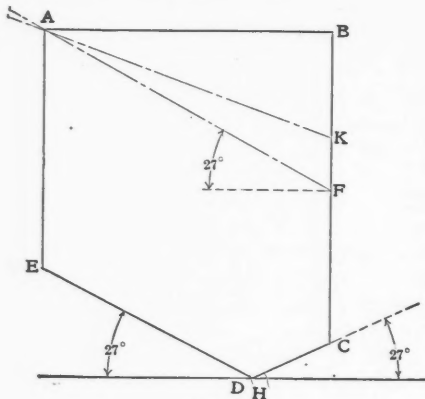


FIG. 1

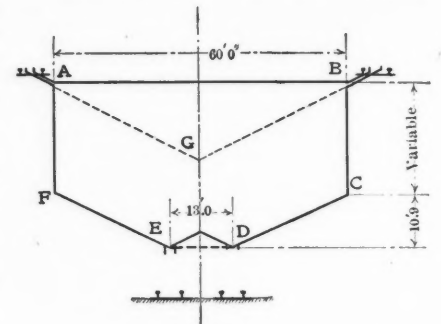


FIG. 2

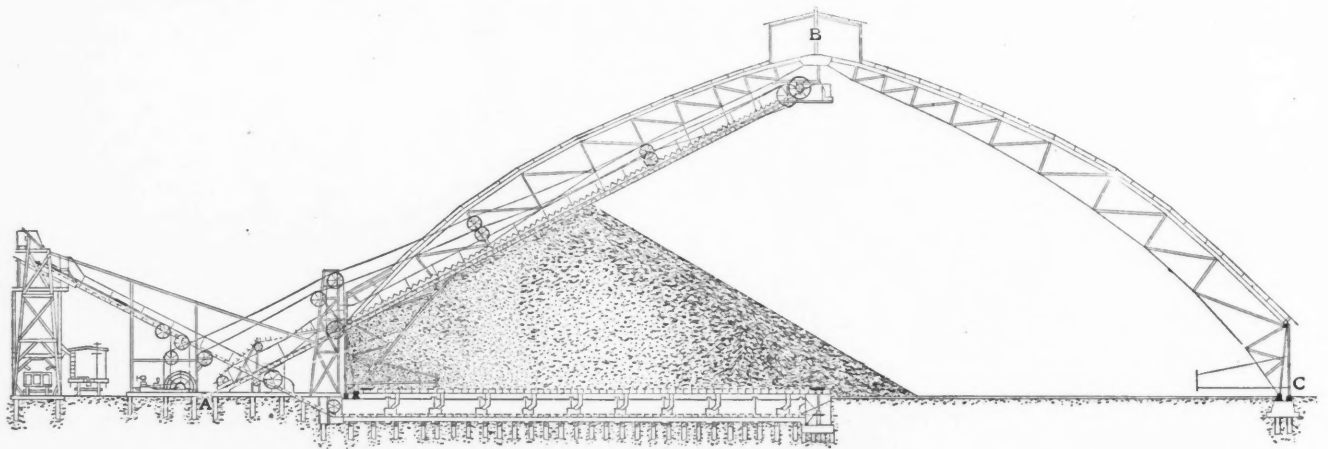


FIG. 3

in consequence many systems of storage have been patented. The problem before the engineer is to determine the volume of coal in storage either in bins or piles, the two systems generally used.

To determine the volume of coal in bins the rectilinear dimensions may be ascertained either by direct measurements or by deductions.

In a free conical pile (not surcharged), it is only necessary to determine the difference of elevation between base and apex, and the angle of repose from which

vary from 1.325, bituminous, to 1.51 anthracite. The next step should be to compile a table showing the number of cubic feet per ton, either long or short, as the case may require. It is always desirable to have results in terms of market units.

METHODS OF COMPILATION

Whenever possible the writer compiles these tables to 10, thus simplifying the work to practically subtraction, which may be entrusted to the cheapest help for checking.

Let it be required to determine the amount of coal in bin, *AB C D E*, Fig. 1.

been filled to line *AB* but has been drawn upon through hopper *H* to line *AK*, the simplest method is to determine the volume per lineal foot of length of cross-section *AB C D E* and deduct from this the volume per lineal foot of length of cross-section *AB K*. Multiply the remainder by the length of bin and the product is the volume *AK C D E*. This is known as the "deduction method."

Of course the same methods apply to a bin of cross-section *AB C D E F*, Fig. 2. This is a type of bin constructed so that two cars may be unloaded or reloaded simultaneously. This is a matter

*Division engineer, Lehigh Valley Coal Company, Wilkes-Barre, Pa.

of great importance to colliery and dock managers in times of shortage of cars.

This bin can economically be constructed to a width of 60 ft. and if desirable be filled to line *AB*. The advantage of this type over Fig. 1 is obvious.

Assuming that the bin has been drawn to *AGB*, then knowing the area of cross-section *ABC . . . FA*, deduct area of cross-section removed, or vacant, *AGB*, multiply remainder by length of bin and product is volume remaining in *AGBC . . . FA*. The bins are measured vacant and cross-section calculated; the lengths are generally variable, and therefore measured in each case.

THE VOLUME OF FREE PILES

The term free pile will be understood to designate a pile formed by freely depositing material from scraper or conveyer lines, or from contained receptacles, such as bags, buckets or stationary chutes discharging from fixed points in the vertical plane passing through the vertex of the pile formed, the material being allowed to assume its natural repose. The pile thus formed upon a horizontal receiving or storage floor, will be a right cone. If the storage floor is not horizontal, the pile formed will be a compound figure which may be resolved into a right cone, and truncated inverted cone passing a horizontal plane at the intersection of the shortest slope and the storage floor. With rare exceptions, the storage floors are horizontal, or with uniformly graded slopes, so that the calculations are greatly simplified.

A system of storage recently patented deposits the coal in prismatic piles by a conveyer or trimmer arm provided with sectional chutes. The arm moves longitudinally upon two tracks along the storage floor. The tracks are of different ele-

The discussion will therefore be confined to the fundamental pile, the cone.

Let it be assumed that the coal has been deposited by a conveyer or scraper line method as in Fig. 3, a system familiar to most engineers.

The two fixed arms *AB* and *BC* con-

cast-iron troughs or chutes about 36 to 48 in. long. These chutes are inserted as the pile increases or are removed when the point of discharge is to be changed.

The arrangement of the chutes is a matter of choice, but the conveyer line with its weight of flights will have a more uniform travel if the chutes are

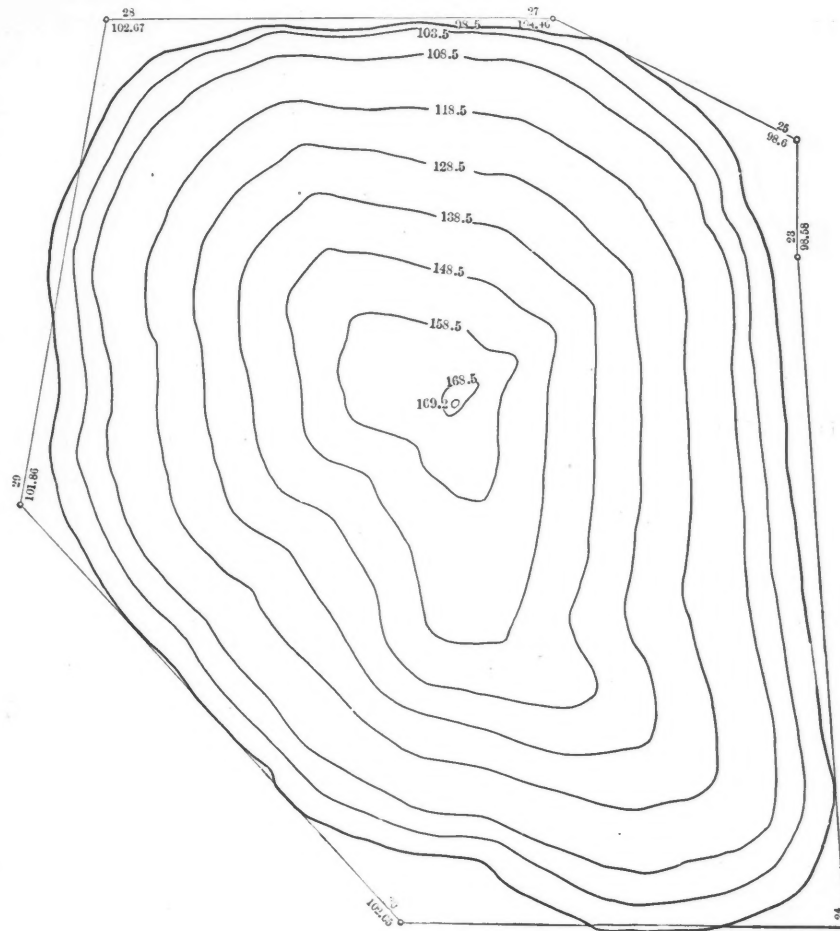


FIG. 4

TABLE NO. 1.

LEHIGH VALLEY COAL COMPANY.
Table of Cubic Ft. per Ton (2240 lb.) of coal of various sizes.

LEHIGH REGION.							WYOMING REGION.							
Tons.	Sizes.						Tons.	Sizes.						Tons.
	Buck.	Pea.	Nut.	Stove.	Egg.	Bro.		Bro.	Egg.	Stove.	Nut.	Pea.	Buck.	
1	41.4	42.1	38.4	38.5	38.8	39.4	1	40.1	40.0	39.8	39.4	41.1	40.4	1
2	82.8	84.2	76.8	77.0	77.6	78.8	2	80.2	80.0	79.6	78.8	82.2	80.8	2
3	124.3	126.3	115.2	115.5	116.4	118.2	3	120.3	120.0	119.4	118.2	123.3	121.2	3
4	165.6	168.4	153.6	154.0	155.2	157.6	4	160.4	160.0	159.2	157.6	164.4	161.6	4
5	207.0	210.5	192.0	192.5	194.0	197.0	5	200.5	200.0	199.0	197.0	205.5	202.0	5
6	248.4	252.6	230.4	231.0	232.8	236.4	6	240.6	240.0	238.8	236.4	246.6	242.4	6
7	289.8	294.7	268.8	269.5	271.6	275.8	7	280.7	280.0	278.6	275.8	287.7	282.8	7
8	331.2	336.8	307.2	308.0	310.4	315.2	8	320.8	320.0	318.4	315.2	328.8	323.2	8
9	372.6	378.9	345.6	346.5	349.2	354.6	9	360.9	360.0	358.2	354.6	369.9	363.6	9
10	414.0	421.0	384.0	385.0	388.0	394.0	10	401.0	400.0	398.0	394.0	411.0	404.0	10

vation, one of such elevation as to receive coal discharged from cars; the other at such elevation as to discharge at the desired height of pile.

The calculations of such piles being a slight modification of those for conical piles, need no further discussion, involving only the prismoid with half-right cones at the ends of the pile.

sist of shallow latticed angle-bar trussed girders, *AB*, the elevating arm and *BC*, its anchor, inclined slightly more than the angle of repose of material piled. Arm *AB* carries a conveyer line with flights spaced about 24 in. center to center. The bottom angles of the truss are riveted, legs facing, so that they may receive the flanges of half-circular flanged sectional

all inserted and removed to suit the point of discharge.

A pile formed, upon the horizontal receiving floor *AC*, by this method will be a right cone, if discharge is free in all directions ($Vol. = \frac{1}{2} H \times \text{area base}$). The base of which is defined by *H* the height of point of last discharge, or of a radius = $H - \tan \alpha$. The angle of repose (α) and *H* are determined by means of an engineer's transit and tape.

VOLUME OF SURCHARGED PILES

In times of pressure for storage capacity the floors are often overloaded 100 per cent. This means surcharging the piles; accomplished by means of side or lateral chutes to conveyer trough and inclined on a less pitch than the angle of repose of material. The delivery of material over these chutes must be assisted and hoes or shovels are employed. The surcharged pile will then assume, in horizontal projection, a shape as in Fig. 4.

To determine the volume of such a pile

it is necessary to locate carefully the base by means of surveys; care being exercised to choose the instrument points or stations so that all necessary auxiliary points may be observed from them. From the stations, the points of change in contour are observed, the vertical angle and distance carefully measured. The measured distances are then resolved into horizontal and vertical components, from which are then calculated the elevations of the various points observed. These are plotted, preferably, on regular cross-section paper 10x10 spaces per inch, and a

CALCULATION OF TAPPED PILES

With the improved systems of storing material, comes also the mechanical means of transferring or re-loading for re-shipment. This, in conical piles, is accomplished by a horizontal transfer arm, on single-rail supports, radially extending over the floor to a length equal to the greatest diameter of the pile, moving about a pivot conveniently located to cover two floors. The transferring arm carries a scraper line, flights about 24 in. centers, traveling in a horizontal plane. The arm

of a right cone, is a parabola *ABC*, Fig. 6.

The contents of a free pile tapped as described may be determined by the following formula:

Vol. = area of parabola, *ABC* × 1/3 perpendicular distance from line *BF* to *E* = 2/3 *ab* × 1/3 *P*; from similar triangles

$$\frac{p}{x} = \frac{h}{b}, \text{ therefore } p = \frac{xh}{b};$$

$$\text{but, } x = \frac{2h}{\tan. \alpha}, \text{ then } p = \frac{2h \times h}{b \tan. \alpha};$$

therefore

$$\text{vol.} = \frac{2}{3} a b \times \frac{1}{3} \frac{x^2 h^2}{b \tan. \alpha} = \frac{4}{3} \frac{a h^2}{\tan. \alpha}.$$

These dimensions are obtained by one operation of the transit and measurement of the cutting face *AC* = *a*.

Ordinarily the calculation has to be made graphically, as the theoretical or ideal conditions seldom exist, and must therefore be treated as the surcharged piles which are calculated by contouring and end-area method as outlined above.

In American copper refineries high-grade anodes are universally used. Usual compositions are: Copper, 98 to 99.5 per cent.; silver, 0 to 300 oz. per ton; gold, 0 to 40 oz. per ton; arsenic, 0 to 2 per cent.; small amounts of antimony, bismuth, iron, nickel, sulphur, selenium,

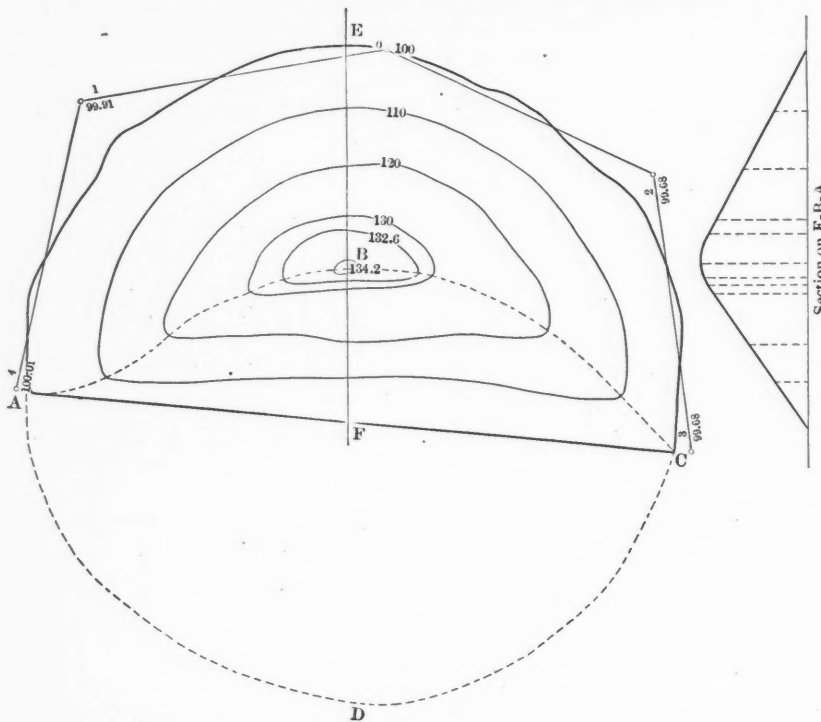


FIG. 5

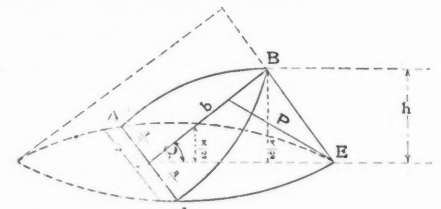


FIG. 6

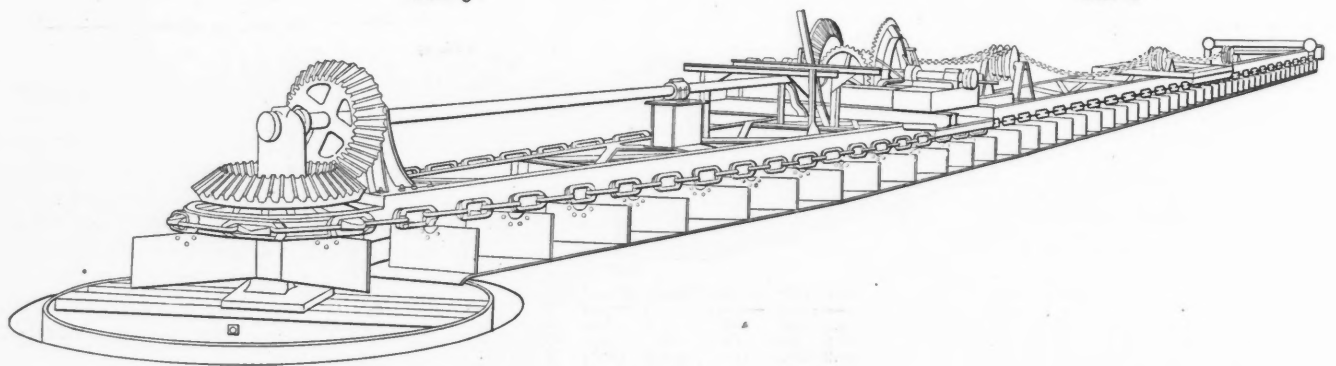


FIG. 7

contour projection drawn. The intervals of contours, not greater than 5 ft., depend upon the regularity of the pile. By means of either rectangles or a planimeter the area of each contour is calculated. Then by the end area formula, (area *A* + area *B*) × interval, or more accurately, $(A + B + \sqrt{A \times B}) \times \frac{1}{3}$ interval, determine the volume of consecutive frustums of the pile.

The Y level could not satisfactorily be used for cross-sectioning of this character.

may be swung into any desirable alignment by means of a clutch engaging a sheave on a vertical shaft driven by the scraper line.

When transferring is started on a pile the transfer arm scraper line will cut a straight line (*AC*, Fig. 5) along the base; the material will, in assuming its angle of repose, develop a face similar to that developed on a cone by passing a plane parallel to one of its sides, the cutting side; this, as is known from the properties

tellurium and silicon. Impurities with soluble sulphates go entirely into solution and grow cumulatively. Selenium and tellurium and the precious metals go entirely into the slimes. We have therefore a triple separation. The usual products are only copper at the cathode, silver and gold from the slimes, and sometimes copper and nickel sulphates from the electrolyte. Selenium and tellurium, especially the latter, are easily recoverable from the slimes, were there sufficient market.

Shot-firers, and Evils of Solid Shooting*

By GEORGE HARRISON†

A great many labor leaders and others advocate shot-firers as the acme of relief for all the dangers connected with solid shooting, and where large quantities of powder are used in one blast in coal mines. Legislative bodies in several mining States have enacted laws providing for shot-firers in mines under such circumstances, the blasting to be done at night after the miners have left the mine. With all due respect to the opinions and honesty of purpose of these advocates of shot-firers, it is evident that a great many of them are not considering this important question in the broad sense it deserves and should be considered. They are only dealing with part of it by providing a means by which the liability to danger is reduced to the lowest possible number; or, in other words, they are not seeking to remove the danger, but simply to transfer it from the men who are responsible for it to the innocent shot-firer who is induced to accept that position because of the small extra wages. The best, and most business and statesmanlike manner of dealing with the question is to remove the cause of danger as far as practicable and to that extent the effect will disappear.

REMOVE THE CAUSE OF DANGER

Let arrangements be made to undercut all coal that can be profitably undercut by hand or machinery. If there is any that cannot be successfully mined in that way it may then be necessary to consider the wisdom of employing shot-firers. In any mine, where, from the presence of fire damp or any other cause, shot-firers would be necessary, we believe the mine should be provided with a sufficient volume of air, as all mines ought to be, to allow shots to be fired any time during the day, the air promptly diluting and carrying away the powder smoke. The shot-firer should be a man of wide practical experience, good judgment, and clothed with a great deal of discretionary power in the firing of shots. He should examine the manner in which the hole is drilled, the amount of powder used in it, see that the place is properly posted, and that no danger from falling roof or standing gas exists. If not satisfied on all these points, he should have the power to refuse to fire any shot, and prohibit its being fired. There is no end of reasons, which are well known to any good, practical miner, why shot-firing at night has many disadvantages and entails considerable loss and annoyance to the best class of miners: besides, the fatalities to shot-firers in the last year bespeak the dangers they assume.

We frankly admit that there are a great many men employed in the mines whose manner of carrying their mine lamps sufficiently exposes the fact that they are not capable of being trusted to drill holes, charge and fire them with safety to themselves and others, and we believe provision ought to be made for the execution of such work by experienced men; but we admire the wisdom and foresight of any man who shuns the position of shot-firer, in which he would be a target for the unpractical man, the unskilled driller of holes, and worse still the unscrupulous powder fiend who is afraid to fire his own shots.

SOLID SHOOTING

It may be well to take into consideration the wasteful methods of producing the coal, which is yearly becoming scarcer and increasing in value. It is not necessary to refer to the methods in other countries, or in other States; the people of Ohio have sufficient motive for a complete study of this question in the destructive and dangerous methods within the confines of their own State. Coal, though supposed to be owned by individuals and corporations, is, to some extent, the treasure of the people, stored in the interior of the earth, a legacy bequeathed by nature for the use and comfort of the people, and the Commonwealth of Ohio surely has a right to see that future generations are not deprived of the advantages and comforts derived from the use of coal on account of the present unjustifiable, wasteful and dangerous methods of producing it.

Following the death of three miners who had returned too quickly to a room in Egypt No. 1 mine, in Tuscarawas county, after firing a large amount of powder in one blast, and who were overcome and suffocated by the carbonic oxide, I accompanied W. H. Turner, inspector for that district, to New Philadelphia, where a conference was held with representatives of the operators and miners, and considerable information was gathered as to the reckless use of blasting powder and the destruction of property and danger to life and limb resulting from this most baneful of all known systems of producing coal.

It is common knowledge that in mines in Tuscarawas county, and in other solid-shooting districts in the State, holes are bored in the solid coal from 6 to 18 ft. deep, and from 6 to 18 lb. of blasting powder used in one charge. The general results of such a procedure are that miners are frequently knocked down by the concussion of a single blast; trap doors are wrenched off their hinges, stoppings and brattices blown out; props that have been placed to support the roof are swept out of place; loaded and empty cars are often turned over; iron and wooden track rails are twisted and broken to pieces; the coal is shattered to slack, and a large portion of it blown back along the room or

entry where the blast takes place, and is irrecoverable.

SOME COALS NOT SERIOUSLY AFFECTED BY LARGE QUANTITIES OF POWDER

There are some kinds of coal that are not seriously affected by the use of a large quantity of powder in producing it, but most bituminous coal, where blasted before being undercut, is so jarred and the effects of the powder so disseminated through the seams and facings of the vein, that when the product is exposed to the atmosphere, rain and sunshine, it falls to pieces like quicklime, and if it is handled two or three times it reaches its destination greatly depreciated in value, disappointing to the consumer, and a source of annoyance to the shipper. The roof in the mines is jarred and shaken by continual concussions from too large charges of powder used by unskilled miners, until the inevitable result is a grinding creep or squeeze, destroying airways and haulways, entailing unnecessary and endless expense, and burying in the earth hundreds of thousands of tons of pillar coal which could be mined cheaply.

There are many more reasons which could be advanced against this pernicious system of mining. It has done more to make the calling of the miner a perilous one than any other cause; placing in the hands of an influx of unskilled laborers, the life of every man who enters such mines.

The great amount of fine coal and dust gathered along the sides and roof, and scattered through every chamber of the mine, is a continual source of danger, combustible in its nature and always liable to cause destructive mine fires, and at any moment a "blown-out" or "windy" shot may take place, igniting a quantity of smoke or gas, raising and igniting the dust and carrying destruction and death through every part of the mine, as has frequently occurred. There may be seams of coal that cannot be profitably mined at this day to compete with others unless this method of mining is resorted to; but it is very questionable if there is any justification for developing a mine in a vein of coal or territory surrounded by natural disadvantages to the extent of inability to meet fair competition, and making calculation on overcoming that inability by the sacrifice of human life and limb. Aside from this, it is safe to say that 90 per cent. of all the coal blasted off the solid in Ohio can be successfully and profitably undercut either with hand or by mining machines. The argument is usually advanced that it would cost more to produce the coal, which, in some instances, is probably true; but the enhanced value of the product would more than offset the extra cost, independent of all the destruction to property, waste of coal and sacrifice of life and limb; moreover, preference would be given to skilled miners.

*From advance copy of the 1906 report.
†Chief inspector of mines, Columbus, O.

Colliery Notes, Observations and Comments

Practical Hints Gathered from Experience and from the Study of Problems Peculiar to Bituminous and Anthracite Coal Mining

DEVELOPMENT AND MANAGEMENT

A strong draft in the chimney is less liable to interruption by gusts of wind than a sluggish draft.

One authority says that in blasting rock of average hardness, $\frac{1}{4}$ to $\frac{1}{3}$ lb. of powder is required per cubic yard.

Oak wood weighs 58 lb. per cu.ft. solid and its specific gravity is 0.93; yellow pine weighs 41 lb. per cu.ft., solid, and has 0.66 specific gravity.

For general purposes the following is an approximate estimate of the weight of loose materials: 14 cu.ft. of chalk weighs one ton; 18 cu.ft. of clay, 21 cu.ft. of earth, 19 cu.ft. of gravel, 22 cu.ft. of sand, respectively, will make one ton.

It has been conservatively estimated that there are 140,000,000 tons of minable coal in Alberta, Canada. The quality of the fuel is graded and estimated as follows: steam and anthracite, 65,000,000,000; bituminous, 25,000,000,000; lignite, 50,000,000,000 tons. In the southern portion of Saskatchewan Province there are 27,000,000,000 tons of workable bituminous and lignite coal.

The height of a chimney depends on the kind of fuel used. One authority says a chimney should be about 75 ft. high for free-burning bituminous coals; 115 ft. for slow-burning bituminous and from 125 to 150 ft. for anthracite coal. If several boilers lead into one chimney, the heaviest work for the chimney is just after firing. It is very bad practice to fire all boilers or all doors simultaneously.

The walls of a good furnace should have as few openings, such as doors, etc., as possible, since every break in the bond of the brick work increases the tendency to cracks, which can never be entirely avoided, and which cause leaks detrimental to economy. Double walls with air spaces between them should always be employed wherever practicable, so that the unavoidable drafts through cracks may be heated and utilized for secondary combustion.

The following table gives the weights of various kinds of wood per cord and the coal equivalent of each in heating value. The weight given is that of a cord of 128 cubic feet:

Wood.	Weight Per C. rd.	Coal Equivalent.
Hickory or hard maple	4,500 lb.	2,000
White oak	3,850 lb.	1,711
Beech	3,250 lb.	1,445
Chestnut or poplar	2,350 lb.	1,044
Average pine	2,000 lb.	890

These determinations are approximate and vary, of course, with the condition of the wood.

It has been demonstrated in practice that a tube or flue of a boiler has much greater strength against internal than against external pressure. It is much easier to maintain circulation through a tube than round about it. It is also easier to clean the inside of tubes than the outside when they are grouped close together in the boiler. A standard iron pipe will stand 2500 lb. internal pressure to the square inch before rupture, while the same pipe would collapse under a much less external pressure.

In burning coal, anthracite requires less air than bituminous coal. As a surplus of air is required for complete combustion, from 20 to 26 lb. of air are allowed per pound of coal. The average amount of air chemically required is 13 lb. per lb. of coal. By taking the air at 62 deg. F. and chimney gases at 500 deg. F., this means that in order to attain perfect combustion, 6 to 14 per cent. of the calorific value of the fuel must be sacrificed in drawing the surplus air through the furnace. Besides, there is a loss in the cooling of the gases, which lessens the quality of heat transmitted to the boiler.

The maximum load per square inch allowed on different kinds of masonry work for bearing plates is as follows: For granite, 1000 lb. per sq.in.; quartzite and hard sandstone, 700 lb.; shale and flagstone, 400 lb.; hard stone rubble, 200 lb.; portland cement concrete, 200 lb.; hard brick work in cement mortar, 175 lb.; ordinary brick work, 100 lb.; mortar, 120 lb.; gravel or sand, 60 lb. per sq.in. Bearing plates on brick work may be considerably reduced in size by placing a strong flat stone under them. The area of the stone should be proportioned and should be at least equal to its projection beyond the iron plates.

Forced draft is often used with good results. It should be an adjunct merely, and not be expected to replace a tall chimney. Combustion is not as perfect under pressure as under a slight vacuum. A little leakage of air inward through the furnace walls helps to supply hot air for combustion and reduces and counteracts losses by radiation. Excessive forced draft, however, which more than counterbalances the draft of the chimney will increase radiation and by leakage through the walls and doors may cause considerable loss, besides interfering with the fireman by making the boiler room hot and uncomfortable.

For continuous use a double belt is the most economical in the long run, except

on small pulleys, or for light duty. Triplex and quadruple belts are sometimes used for heavy duty. The belt speed should be 4000 to 4500 ft. per min. The idler pulleys should be located on the slack side of the belt, about one-fourth of the way from the driving pulley. Belts are more durable and work more satisfactorily if they are made narrow and thick rather than wide and thin. As belts increase in width they should also be made thicker. For dynamo and electric motors the ends of the belt should be fastened together by splicing and cementing, instead of lacing. Belts should be cleaned and greased every five to six months.

The presence of sulphur in some of the different steam-pipe coverings makes it imperative that moisture must be kept from the coverings to prevent the water from combining with the sulphur and forming sulphuric acid, which will attack the pipe. Much of the inefficiency of coverings is due to the lack of attention given them. All coverings should be looked after at least once a year and given necessary repairs. Each 10 sq.ft. of uncovered pipe will condense, in winter, 105 lb. of steam during a day of 10 hours. Under the same conditions the same pipe, insulated with the best covering, will condense about 8½ lb. of steam; in summer these figures will be reduced respectively to 8 lb. and 6½ lb. of steam.

In setting a boiler of the Heine type the front water-leg must be placed firmly on a set of strong cast-iron columns, bolted and braced together by the door frames, dead plate, etc., and forming the fire front. This is the fixed end of the boiler. The rear water-leg rests on rollers which are free to move on cast-iron plates firmly set in the masonry of the low and solid brick wall. Whenever the brick work closes in to the boiler, broad joints are left which are filled in with tow or waste, saturated with fire-clay or any other pliable refractory material. The boiler and its wall are therefore free to move separately during expansion or contraction without loosening any joints in the masonry. On the lower and between the upper tubes are placed light fire-brick tiles. The lower tier extends from the front water-leg to within a few feet of the back one, leaving there an upward passage across the rear ends of the tubes for the flame and gases. The upper tier closes in to the rear water-leg and extends forward to within a few feet of the front one, thus leaving an opening for the gases in front.

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*Illustrated.

The Mesabi Miners' Strike

The strike of the miners employed by the Oliver Iron Mining Company, on the Mesabi iron range, from all accounts so far received, is likely to be a troublesome one. The Oliver company represents the iron-ore interests of the United States Steel Corporation, and the strike seems to be directed chiefly against that company, though at least one large independent mine is involved. It was preceded, by a few days, by the strike of the ore-handlers at the Duluth docks, but that movement does not seem to have had any direct connection with the present one.

Briefly, the officers of the Miners' Union on July 18 served notice on the Oliver company of a demand for increased wages. The schedule asked for was, on eight-hour shifts, \$2.50 on outside or open-pit work; \$3 for underground work; \$3 for firing, pumping, blacksmith and other skilled work; \$5 for engineering and mechanical work. Ten days was given the company for an answer; but without waiting that time the men went out on July 20, completely stopping work on the range, which had already been tied up, in great part, by the trouble at the Duluth docks. The men who were not members of the union seem to have joined in the stoppage, doubtless considering it most prudent to do so, in view of the attitude of the union miners. The company, it is reported, will refuse to make the concessions asked; but this rumor is not based upon any positive indications, or statements from its officers. In fact, they seem to have been rather taken by surprise at the precipitate action of the men. There had been no previous negotiation, and no complaints had been filed of any importance. It looks very much as though the present strike was largely for the purpose of forcing some recognition of the union and its power. Quite possibly this may make the matter more difficult of settlement than a simple difference as to rate of wages would be. The time for the strike was well chosen to secure success.

The Lake Superior district for a number of years was measurably free from labor troubles. About three years ago the Western Federation of Miners sent men to organize the region, at first meeting with small success, but later gathering in a number of members, especially on the Mesabi. Since then there have been a number of small troubles, but no

general strike until the present time. The miners and laborers on the Mesabi are almost all foreigners, Finns, Swedes and Italians predominating, in the order named. Unlike those on the Old Ranges and in the copper country, they are rather inclined to a semi-nomadic life, owing to the closing down of many of the mines in the winter. Should the strike continue for more than a few days, it is probable that many of them will leave, as this is just the season when they can get work in the harvest fields of the Northwest. In that case it will be difficult to get a full force together again this season.

The effect upon the iron trade depends chiefly on the duration of the strike. It has been the policy of the Steel Corporation to carry large stocks of ore in the furnace yards, and there will probably be no immediate shortage there, though some merchant furnaces may suffer. But mines and carriers have been working to their full capacity in anticipation of the needs for next winter, and the loss of time in the height of the season may mean a scarcity of ore later; especially if the present demand on the furnaces should continue. Unless the season of navigation should last longer than usual, it will be impossible to make up for time lost now. Winter rail shipments are costly, and the chances are that the railroads will not be in a position to handle large quantities of iron ore. A long strike will mean a serious situation for many iron and steel companies, and for the Steel Corporation itself.

Copper Production

One of the governing factors in the declining tendency of copper is the increased production in the United States. The statistical guesses, which have been published, showing a decrease in the production during the first six months of the year have been incorrect. Certain companies have made a slightly decreased output because they have been mining their lower grade of ore to take advantage of its increased value at the high price for copper, but other companies have increased their output for the same reason, and the production of new mines has been coming into the market.

From now on the increase in production will be rapid, particularly in Utah. Early in July the Utah Copper Company put the fourth section of its Garfield mill in operation and it is now concentrating

2000 tons of ore per day and producing at the rate of nearly 17,000,000 lb. of refined copper per annum. The remaining eight sections of the mill, which will give a total capacity for 6000 tons of ore per day, will be ready for operation soon, while the Boston Consolidated is rapidly bringing its porphyry mine and Garfield mill (3000 tons per day) into readiness for production. The smelters of the Salt Lake valley are congested with copper ore and the Rio Grande railway is finding great difficulty in moving the tonnage out of Bingham on account of insufficient equipment. These are limiting conditions upon the increasing production of Utah for the present, but the capacity is being extended as rapidly as possible. The Garfield smelter is to be practically doubled by the end of the year, machinery intended for the San Bruno works being now in course of installation there. The urgency of the situation in Utah was one of the reasons for the suspension of construction at San Bruno.

Plans for a great new production of copper have been in execution for two years back. They are now beginning to be consummated and the various enterprises will be reaching the productive stage rapidly. First the Utah Copper Company; then the Boston Consolidated; Balaklala; Nevada Consolidated; and within a year perhaps the Copper River district of Alaska. Besides these there are many smaller enterprises. The copper production of the United States will show an important increase in 1907, in which Utah will show the largest gain, not only proportionally but also in the direct amount. It is to be remarked, moreover, that all of the great enterprises which are now coming to fruition are to be producers of copper at comparatively low cost and have been planned on a basis for the metal that is much lower than exists at present.

The Division of Mineral Resources

An order from the director of the United States Geological Survey, published on another page, announces an important change in the Division of Mining and Mineral Resources, to which is assigned the duty of collecting and compiling the statistics of mineral production. Dr. David T. Day, who has been the responsible head of the division for 21 years past, and who organized and built up this

work, retires at his own request. He will not leave the Survey, however, but will devote his time to the comprehensive investigation of the petroleum resources of the United States, for which special provision has been made. To this subject Dr. Day has given much time in the past, and he will now be free to continue its study without the pressure necessarily involved in supervising the work of the entire division. That work has brought him into contact with mining men all over the country, and he is one of the most widely known members of the Survey.

His successor—with the title of "Chief Statistician," is Edward W. Parker, who has been his chief assistant for a number of years, and who is also widely known from his work in collecting the coal and coke statistics and from his service as a member of the Anthracite Strike Commission. It is sufficient to say that Mr. Parker is thoroughly familiar with statistical work, and that it will be carefully and intelligently conducted under his charge.

The work of the division will now be divided into two coördinate branches. In addition to his responsibility as chief of the division, Mr. Parker will have special charge of the branch dealing with the production of the non-metallic minerals—of which coal is the chief—and of iron ore; while the output of metallic ores and of the metals, with the exception of iron, will be under the charge of Waldemar Lindgren. The acceptable work in this line done by Mr. Lindgren for the past year or two is known and recognized by those who are in contact with the division, and are working on similar lines.

The Lead Assay

We have frequently urged that the fire assay for lead should be relegated among the obsolete methods along with the fire assay for copper. We believe that there has been a certain progress in this direction, but so far it has been confined to the more purely technical work. The smelter and millman, realizing that they can accurately determine their metallurgical results only if they know correctly how much lead they have in the ore treated, and recognizing that the wet assay is the only one that will afford such knowledge, have in many cases discarded the fire assay for their technical purposes. But

the smelters of the far West continue to buy ore on the fire assay and the miners continue complacently to sell their product on the same inaccurate basis. It is strange that the miners do not insist upon settlement for their ore upon the wet assay, and that only. If they should take a strong position in this matter, the smelters would sooner or later be obliged to meet their views, because their views would be right.

It is scarcely necessary at this time to discuss further the inaccuracies of the fire assay, because that subject has been gone into fully in our columns and those of other technical journals, and in the transactions of various technical societies. It is recognized that the fire assay for lead is commonly too low in its results, occasionally too high, but anyway nothing better than a piece of pseudo-scientific guesswork. This being the case, the smelter without doubt takes care that the chances, at least, will not be against him. At any rate, the miner who sells lead ore on the basis of the fire assay does not know how much lead he is selling; he knows only how much he is being paid for.

In demanding of the smelters that the wet assay be adopted as the uniform basis of settlement, the miners would not be creating a precedent, because for many years all of the lead ore produced in Missouri has been bought and sold upon that basis. This means approximately 30 per cent. of all the lead that is produced in the United States. They are upon the only correct and rational basis in the marketing of lead ore. The miners of the Rocky Mountains should endeavor to get upon the same basis as soon as possible in spite of opposition from smelters who are disinclined to make the change.

The Modern Blast Furnace

The article on the "Modern American Blast Furnace," by Professor Bradley Stoughton, on another page of this issue, is a condensed description of the latest practice in this country, in the construction of the iron blast furnace. It includes the latest improvements in charging and handling raw material, which have enabled our furnaces to make outputs of pig iron far in excess of anything before attempted. In fact it is the mechanical handling apparatus, and the casting machine which have made the larger furnaces possible.

Views, Suggestions and Experiences of Readers

Comments on Questions Arising in Technical Practice or Suggested by Articles in the Journal, and Inquiries for Information

CORRESPONDENCE AND DISCUSSION

Roasting for Magnetic Concentration of Zinc Ore

On page 1205 of the JOURNAL, Vol. LXXXIII, F. H. Trego, under the above caption, says: "As a matter of fact the Mills roaster is running whenever they have the ore which they wish to treat in that manner."

This statement is certainly misleading. Mr. Trego built the roaster for the Mills Mining and Reduction Company under a guarantee. George Y. Bast, manager of the Mills Mining and Reduction Company, gave the roaster a careful test, and the results proved that it fell short of the guarantee. The Mills mine produces from 120 to 160 tons of raw concentrate weekly, and we are obliged to sell this at a sacrifice to the Mineral Point Zinc Company, in consequence of the fact that the plant furnished by Mr. Trego is unable to handle it.

FRANK NICHOLSON.

Joplin, Mo., June 24, 1907.

Lightning Shocks in a Mine Tunnel

In a letter received from the general manager of a mining property in Colorado, in which we are interested, the following singular phenomenon is related, and it occurs to us that it may be of interest to your readers, as it would also be interesting to us to know if there are any similar cases on record:

"During a severe electrical storm this afternoon, a miner holding a drill in the deep tunnel, 2400 ft. in from the portals, was so severely shocked he could not let go of the drill. The man who was striking did not feel it, but the drill man was badly frightened. To my mind, this proves the continuity of the vein to the upper surface tunnel, 600 ft. above, although no connections have yet been made. In the upper tunnel there are 700 ft. of steel track running in on the vein and extending out-doors 100 ft. to a high dump where the 'wireless' could collect, charge the vein, and send its energy to the mine below."

We might add that the ore is sulphide, heavily charged with white iron pyrites, and carrying fairly high values in gold.

W. D. JOHNSON & Co.

New York, July 15, 1907.

Size of Anode Furnace Charges in Copper Refining

The following note, signed by John Clark, who is in charge of the refining furnaces at the Chrome refinery of the United States Metals Refining Company, is of interest:

"On July 8 the banner charge to date was cast from furnace No. 1. Of course it was not all put in at one filling, part of the charge being put in on Sunday. The figures are, for good product, 413,469 lb. The bad product amounted to seven pieces or 3500 lb. The casting was started at 7 a.m. and finished at 12:15 p.m., over 25 tanks of stripper anodes being cast. This is the largest production of our plant for one charge, and the largest for a refining furnace anywhere, as far as I know."

These record charges are made on Monday mornings, because the furnace is refilled on Sunday. The average weight per charge cast is somewhat less. For instance, for the week ending June 12 this same furnace cast six charges, the average weight being 308,564 lb. It is interesting to note that about 10 years ago, in the most modern refining works, the average weight of charge cast was from 42,000 to 48,000 lb. These furnaces were not equipped with mechanical apparatus for casting the copper. Since that time several casting machines have been developed, which are now in general use. The casting speed of the Walker apparatus, with single-bar molds, when working on wirebars, was from 20,000 to 30,000 lb. an hour. By the use of a double-bar mold this casting speed was doubled. Correspondingly, the speed of casting anodes has been increased by making heavier castings, and in the case mentioned above the casting speed is about 80,000 lb. an hour.

With the increase in casting speed the size of the furnace was increased, from time to time, from 100,000 to 150,000, and then to 200,000-lb. charge. At this point the question of getting the charge into the furnace begins to become a limiting condition. The ordinary speed of filling by hand, with air-lifts for placing the material on the paddles, is 35,000 to 40,000 lb. per hour for each charging door. Ordinarily there are two charging doors per furnace, but with a 300,000-lb. charge this would require, say, four hours for filling; which, with the four hours required for casting, and a certain amount of time required for miscellaneous work, makes a working day much longer than the men

can stand, because the work is very hard on them.

Some of the recent large furnaces have, therefore, been provided with four charging doors, but the arrangement of the furnace with respect to casting apparatus and waste-heat boiler is then not as convenient as is the case when only two doors are used for charging.

The question of charging these large furnaces becoming an important one, has developed the mechanical charging crane which was recently described in the JOURNAL. With this crane two men can charge 300,000 lb. in one hour, whereas, with two charging doors working, it would require, for hand charging, a gang of 10 men for four hours to charge the same amount.

It is believed that by the use of the charging crane another limitation to the size of furnace charges has been removed, so that at present there is practically no limit to the size of the charge, except that caused by the fact that it is not desirable to limit any plant to a small number of units. For instance, a plant handling 12,000 tons of cathode a month will have about 480 tons to cast per working day, which could be handled by three furnaces, with one spare furnace to be used in emergencies, and when the other furnaces are being repaired. It would hardly seem desirable to attempt to cast this product with two furnaces, with one spare, as then an accident to one of the furnaces affects too large a percentage of the total capacity.

The improvements outlined above, whereby a record charge is now cast, approximating 10 times the weight of charges in use 10 years ago, have been obtained entirely by the substitution of mechanical methods of handling material for hand work, and the progress in other departments of copper-refining work has practically all been along the same lines, as the chemical and metallurgical features of the process have not been substantially changed.

H. H. PROSSER.

Salt Lake City, Utah, July 15, 1907.

The Deepest Bore-hole

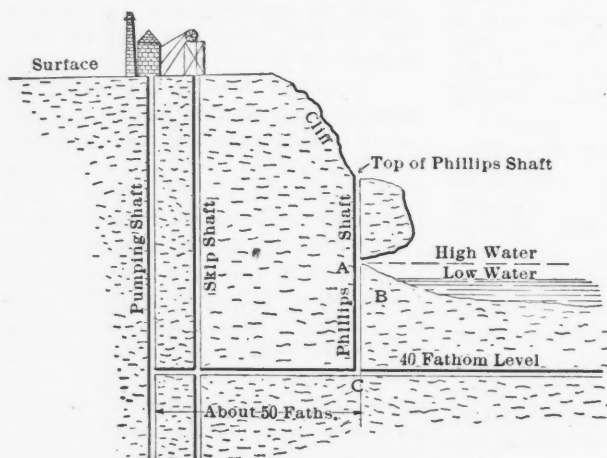
In the JOURNAL for July 6, we note, in your colliery notes column, an item regarding the deepest diamond bore-hole in the world. We believe that this is incorrect, as our information shows that the deepest diamond-drill bore-hole was put down in Upper Silesia, in 1900, to a depth of over 6700 ft. The next deepest

hole was bored with a Sullivan class F diamond drill on the Rand, South Africa, in 1905, and was 6340 ft. deep. This record was somewhat advertised at the time, and we believe you published information in regard to it.

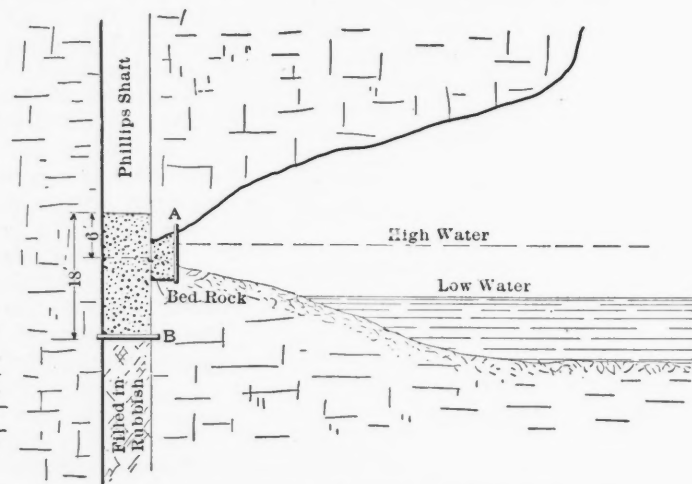
SULLIVAN MACHINERY COMPANY,
per S. B. KING.
Chicago, July 10, 1907.

The Yellow Dog Mill in the Joplin District

In the description of the Yellow Dog mill in the Joplin district, in the JOURNAL of July 13, p. 63, you have made a slight error in describing the basket conveyer. The article says that the chains connecting the buckets are bars of $1\frac{1}{2} \times \frac{1}{2}$ -in. steel. This would carry the impression that it was ordinary steel. Instead they are made of the very finest quality of steel and drop forged, which gives a much



SECTION OF LEVANT MINE



ENLARGED SECTION, SHOWING CONCRETE WORKS

wider surface in the wearing parts, and, of course, costs much more.

Naturally we are very much interested in this system. The Underwriters' Land Company has been using one of these elevators for about $2\frac{1}{2}$ years, and the second one was put in about six or eight months ago. The chain in the first one shows very little wear up to the present time. The superintendent, W. O. Coats, informs the writer that the labor cost of elevating the ore a distance of 300 ft. by these elevators is less than 0.5c. a ton. If this be true, then you will readily understand the importance of this system of elevating ore. It is much cheaper and much better in every way than the old system. As we understand it, this is one of the largest zinc-producing mines in the world.

C. O. BARTLETT.
Cleveland, O., July 15.

A cubic foot of natural gas contains approximately 1000 B.t.u.

The Sea in the Levant Mine, United States Geological Survey Cornwall

J. S. Martin, inspector of mines, gives an account, in his report for 1906, of the incident that happened during that year at the Levant mine, Cornwall, when the sea broke into some of the old workings. The mine is situated at the edge of the cliffs at Pendeen, near St. Just, not far from Lands End, and, like some others in the same district, extends for a considerable distance under the Atlantic ocean. In 1893 a serious accident happened at an adjoining mine, Wheal Owles, owing to the levels being flooded by sea water; so it is not to be wondered that when, last year, sea water made its appearance in the levels of Levant, the men refused to go to work, although the amount of water was not really serious. For some time the exact source of the water was not ascertained, but eventually it was traced to the Phil-

The following order was issued by Director George Otis Smith on July 20: "The resignation of Dr. David T. Day as chief of the Division of Mining and Mineral Resources has been accepted to take effect Aug. 1, and Edward W. Parker is hereby designated to succeed him, with the title of Statistician in Charge.

"The plan of co-ordinating administrative control and scientific supervision adopted in the Division of Geology and Paleontology has proved so satisfactory that it seems advisable to extend it further in the Geologic Branch. At the present time two sections will be established in the Division of Mining and Mineral Resources to provide for such scientific supervision of the work of the division.

"1. Metalliferous ores, except iron, in charge of Mr. Waldemar Lindgren.

lips shaft, which had not been in use for 50 years and was full of débris. This shaft, as is shown in the diagrams, was sunk right on the edge of the cliff. It was found that the waves had eroded the side of the cliff and made a communication with this shaft at A, the hole being about 4.5×3 ft. Only at high tide and in stormy weather did the water go through the hole and into the shaft. The water percolated through the débris and fell into the 40-fathom level, which, as is shown in the illustration, runs right under the sea. The matter was soon remedied by building a concrete dam from A to B. Inspection at C showed that the dam is quite effective.

Interest in the tin mines of the Erzgebirge of Saxony and Bohemia, has recently been revived. On the Saxon side there are old mines at Geyer, Schönfeld, Schwarzenberg, Seiffen, Zinnwald and Ehrenfriedersdorf and, on the Bohemian side at Platten, Barringen, Neudeck, and Joachimsthal.

"2. Non-metalliferous minerals, and iron, in charge of Mr. E. W. Parker.

"Mr. Lindgren's connection with the work of this division has already contributed much to the increased value of the report, and the new form of organization here outlined is merely the recognition of an actual condition.

"The section chiefs are expected to confer freely in planning for the work of the division, and for the execution of these plans, as approved by me, Mr. Parker as the administrative chief will be responsible."

Dr. Day has been relieved from the charge of the division at his own request, and will hereafter devote his time to the investigation of the petroleum resources of the United States; a subject to which he has already given much attention.

Steel troughs, valves, hoppers and chutes are used almost exclusively in large plants, where formerly these were made of wood.

The Wedge Furnace

A new furnace of the McDougal type has just been placed on the market by the Pennsylvania Salt Manufacturing Company. It is the Wedge furnace, one type of which is shown in the cut herewith. This furnace has the following features:

The revolving central vertical shaft to which the arms are attached is 4 ft. in diameter, giving easy access to the center of the furnace. With this type of furnace the two opposite arms can be secured by bolting them together in the center of the vertical shaft. The bolts or other fastenings which secure the arms are thus not exposed to the flame of the furnace. The arms are rendered durable by an efficient system of cooling. An air pressure is maintained by a fan or other similar means on the interior of the vertical shaft, the only escape for the air being through the arms and thence out through pipes in the interior of the vertical shaft, which forces a definite air circulation through each arm. There is no machine work on the arms excepting where the right- and left-hand arms bolt together in the center of the furnace.

The vertical shaft is constructed of steel protected from the flame by an exterior covering of brick which revolves with the shaft. The brick are supported on cast-iron rings, which are riveted to the vertical shaft in such a position that they are a protection to the brick in case of workmen spudding the floors of the furnace. The right- and left-hand arms are shoved through opposite openings in the vertical shaft. Inasmuch as an air pressure of a few ounces is maintained on the interior of the vertical shaft, any leakage around the arms where they enter the vertical shaft would be from the shaft into the combustion chambers, but this is entirely prevented by a cast-iron lute filled with fine asbestos, which makes a tight joint without necessitating any machine work on the furnace arms. The circulation of air through the arm is effected by means of a diaphragm in the center of the arm, which forms a passageway for the air or water, whichever is used for cooling, out along the bottom of the arm and back along the top of the arm, so that the entire arm is effectively cooled.

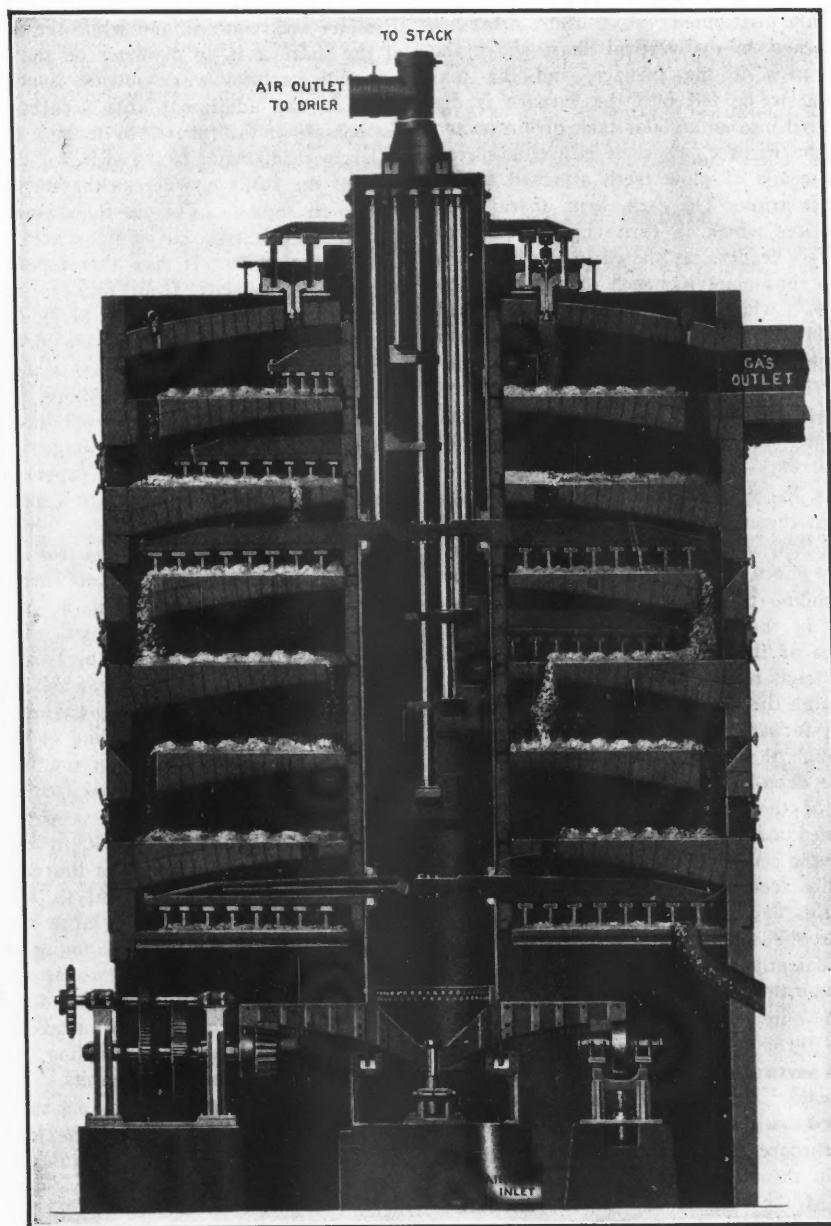
If air is used for cooling, as shown in the cut, the flow of the air is confined by a hood and a lute underneath the large gear at the bottom of the furnace, the lute being filled with water. After the heated air has been carried upward from the arms through the pipes, the hot air is collected by another hood, whence it can be allowed to escape into the atmosphere through a stationary vertical stack, or it can be carried through a branch pipe to a louver-board drier where the ore can be dried before being carried up to the feed tank on top of the furnace.

The rabble teeth are readily removed by reaching in from the exterior of the

furnace with a hook and sliding them off from the arm. In classes of work where the rabble teeth and the holders, which both slide off together, do not corrode, only the plain rabble blade requires to be replaced when worn out, while the holder continues in use. This arrangement of the rabble teeth is an improvement over the rabble tooth described in the application made by Mr. Wedge to the United

is supported solely on the six heavy roller bearings underneath the furnace.

A test was recently made of two of these furnaces when in operation roasting cupreous iron pyrites fines in connection with the manufacture of sulphuric acid. The furnaces tested were 20 ft. in diameter, and each furnace was roasting at the time 12 tons of pyrites in 24 hours, or 24 tons in 24 hours for the two fur-



THE WEDGE ROASTING FURNACE

States Patent Office in September, 1898, which showed the rabble blade and rabble holder as one casting; the present construction, whereby the rabble blades only require to be replaced, reduces repairs to a minimum.

This vertical shaft with its arms is entirely supported by roller bearings underneath the furnace. It is held central by a center pin without the customary step at the bottom of the shaft. There are no other bearings for the central shaft, which

naces, and the indicator showed the power consumed by the two furnaces thus operated as 3 h.p. One No. 6 Sturtevant fan was used for circulating air through the arms of the furnace, and the complete tests showed as follows: Friction load, engine and shafting, 10 h.p.; same with Sturtevant fan, 15 h.p.; same with two furnaces added, 18 h.p. The power consumed increased only 3 h.p. when two furnaces were in operation.

In furnaces of this type there is often a

loss in capacity where the material is fed in at the top at only one point, the material not being spread evenly in that case over the top floor, and usually only one-third of the top floor is utilized in consequence. This loss of capacity is overcome in this furnace by feeding the material into the top floor of the furnace at a number of different points. In the furnace 20 ft. in diameter six feed-spouts are used so that the material is very evenly distributed. Four short arms are attached to the vertical shaft above the top arch of the furnace, and the material to be fed into the furnace is delivered into an annular tank or bin on top of the furnace, where it is evenly spread by means of plow teeth attached to the short arms. On each arm there is a knocker which in turn engages each of the six feeders, as shown in the cut, each arm thus emptying each of the six feed-pipes, which are immediately closed again by a counterbalance after each arm passes, and the plow teeth which immediately follow throw material into the spouts again, thus keeping them sealed against the escape of gas from the furnace.

As the material to be roasted feeds down through the furnace, first outward and then in toward the center on alternate floors, it is, of course, met by the ascending current of air and combustion gas, in the same way as in other furnaces of this type. With some material this tends to flux the material as it passes through the drop-holes through the floors. This furnace is provided with poke-holes through the shell by means of which all these drop-holes near the outside periphery of the furnace can be conveniently cleaned and kept open. The drop-holes near the center of the furnace are always readily accessible from the larger doors, but this device of poke-holes through the outer shell makes it always possible to conveniently reach the outer drop-holes through the furnace floors.

The outer shell of this furnace is $\frac{1}{2}$ -in. steel throughout, and is constructed of eight vertical sheets without any horizontal seams; the vertical seams are double riveted with $\frac{7}{8}$ -in. rivets. The drive of the furnace is provided with shear-pins which shear off before any mechanical part of the furnace can be subjected to enough strain to break anything.

The horse-power required in the normal operation of the furnace is so small that a shear-pin $\frac{3}{16}$ in. in diameter is sufficient to rotate the furnace when carrying its full load.

The capacity of a furnace 20 ft. in diameter when roasting sulphuret ores under the conditions that prevail at the Western smelters is from 70 to 85 tons through one furnace in 24 hours. The capacity of the same furnace roasting pyrites fines under the conditions necessary for the manufacture of sulphuric acid by the chamber process is from 12 to

18 tons of fines in 24 hours, according to the sulphur contents of the fines to be roasted.

This large capacity is secured by the following features:

1. Utilizing the full capacity of the top floor of the furnace.
2. The large diameter central shaft gives such a convenient and substantial means of securing the arms in the shaft that the objections to a furnace of a large diameter are removed, and while the area of the shaft, 4 ft. in diameter on the inside with its brick work outside, is about 15 sq.ft., the additional area secured at the outside of the furnace by making it 4 ft. larger in diameter is 113 sq.ft. for each floor of the furnace, whereas the furnace has seven floors. The 20-ft. diameter furnace of this type has a floor area of nearly 1800 sq.ft. It has therefore an area and a capacity from four to five times as large as the small McDougal type furnaces, many of which are in use in the Southern States, and it has a capacity of from 30 to 50 per cent. more than the McDougal type furnaces used in the Western smelters. The advantages of this large capacity are very apparent when the following features are considered.

A plant of ten 12-ft. furnaces, for example, would require a house to shelter them approximately 114x53 ft. in case they were placed in parallel rows. The same capacity could be secured by two of these large furnaces which, allowing for ample clearance on all sides, would call for a house 69x44 ft. The saving in the cost of the house for sheltering the furnace should offset the additional cost of the larger furnace.

The centralizing of the work in the larger furnace greatly simplifies the economic handling of the material to and from the furnaces. Where these large furnaces have been installed the handling of the material to and from the furnaces has been accomplished with great economy, as compared with the cost of installing and operating appliances for handling the material to a larger number of units.

Further, this furnace is built along such heavy and substantial lines that the loss of capacity by stoppages is less than in the case of smaller and more lightly constructed furnaces at present in use.

One of these furnaces has ample capacity to operate a set of acid chambers of 200,000 cu.ft. capacity.

The inventor of this furnace, Utley Wedge, of Philadelphia, was the originator of the application of the muffle principle to furnaces of the McDougal type; this is covered by U. S. patent No. 654,335. One form of the furnace with the central vertical shaft of large diameter is shown in the cut herewith, which represents a furnace with one working floor with a muffle both above and below the working floor. This style of furnace has been constructed 32 ft. in diameter, and has a

capacity when used for the chloridizing of ore of from 70 to 80 tons in 24 hours. This furnace, 32 ft. in diameter, has been in use in connection with the chloridizing of cuprous ore. Many of the details of its construction are very similar to the 20-ft., seven-floor furnace described above, excepting that the cut shows the arms cooled by water instead of by air.

This furnace construction is protected by patents in Germany, England, Belgium, Norway, Sweden, France, and elsewhere.

New Publications

THE USE OF THE NATIONAL FORESTS. Issued June 14, 1907, by the U. S. Department of Agriculture. Pp. 42; illustrated. 5x7 in.; cloth. Washington, 1907; U. S. Department of Agriculture.

THE JUNEAU GOLD BELT, ALASKA. By Arthur C. Spencer. A RECONNAISSANCE OF ADMIRALTY ISLAND, ALASKA. By Charles Will Wright. U. S. Geological Survey, Bull. No. 287. Pp. 161; illustrated. 6x9 in.; paper. Washington, 1906: Government Printing Office.

THE COLUMBIA ENGINEER. TRANSACTIONS OF THE ENGINEERING SOCIETY OF COLUMBIA UNIVERSITY, 1906. Pp. 100; illustrated. 6 $\frac{1}{2}$ x9 $\frac{1}{2}$ in.; cloth. New York, 1906: Engineering Society of Columbia University.

Contents: Hydraulic mining in British Columbia, by H. W. Dubois. Coal-mine fires, by R. V. Norris. The creation of a manufacturing plant, by W. B. Snow. The microscopic examination of metals, alloys and other opaque material, by William Campbell. Substantial performance of a building contract, by George D. Russell. Some of the relations of railway transportation in the United States to mining and metallurgy, by James Douglas. Our present weights and measures and the metric system, by H. R. Towne.

The Moore Filter Patents

We are informed that the three years' litigation involving the well known Moore filter patents for treating slimes has come to an end, with the result that all rights, titles, interests and claims now rest with the Moore Filter Company, whose New York office is at 40 Pine street. The company is represented in the West by J. V. N. Dorr, 204 Bank building, Denver, Colorado.

Out of 880 mines which are operating in the United States, Canada and Mexico, 379 report gold values, 308 report copper, and the remainder report silver, lead, cobalt, zinc, oil, etc.

Patents Relating To Mining and Metallurgy

A Selected and Classified List of New Inventions Described during the Past Month in the Publications of the Patent Offices

UNITED STATES AND BRITISH PATENTS

A copy of the specifications of any of these patents issued by the United States Patent Office will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to give the number, name of inventor and date of issue.

ALUMINUM

CASTING ALLOYS. Method of Casting Aluminum Alloys. William A. McAdams, Bay Shore, N. Y. (U. S. No. 859,612 and 859,888; July 9, 1907.)

REFRACTORY PRODUCTS. F. Engelhorn, Mannheim, Germany. Improved method of forming dishes and other articles out of molten alumina mixed with other oxides. (Brit. No. 16,714 of 1906; June 29, 1907.)

COAL AND COKE

BRIQUETS. J. Buss, and C. Fohr, Maisbach, Germany. In making briquets of fuel, the use of naphthalene as a binding agent used hot, the heat being supplied during the process by means of superheated steam. (Brit. No. 28,576 of 1906; June 29, 1907.)

BRIQUETS—Method of Preparing Fuel Briquets. Harry W. Jordan, Syracuse, N. Y., assignor to Semet-Solvay Co., Syracuse, N. Y., a Corporation of Pennsylvania. (U. S. No. 857,287; June 18, 1907.)

COAL CUTTERS. H. Hirst, G. Houghton and W. Elvin, Densbury. An improved arrangement of drills for coal cutter, so that first a short drill and afterwards a long drill may be used in cutting a hole without moving the machine. (Brit. No. 18,306 of 1906; July 6, 1907.)

COAL CUTTERS. W. Kracht, Giessen, Germany. Improved carriage for carrying coal cutters. (Brit. No. 15,781 of 1906; July 6, 1907.)

COAL CUTTING MACHINE. F. W. Hurd, Glasgow, Scotland. In the inventor's coal cutting machine, methods of tilting and adjusting the bar so that there shall be no backlash. (Brit. No. 24,125 of 1906; June 29, 1907.)

COAL-MINING DRILL-POST. Paul Rommes, Pittsburg, Kan. (U. S. No. 858,217; June 25, 1907.)

COAL-MINING MACHINERY. Arthur H. Gibson, Easton, Penn., assignor to Ingersoll-Rand Co., New York, N. Y., a Corporation of New Jersey. (U. S. No. 860,207; July 16, 1907.)

COKE. T. W. Drinkwater and H. O'Connor, Edinburgh, Scotland. Removing arsenic from coke by sprinkling the coal with salt, the effect being to form chloride which is volatile. (Brit. No. 29,599 of 1906; June 29, 1907.)

PEAT MACHINE—Machine For Forming and Compressing Peat. Robert S. Lawrence, Boston, Mass. (U. S. No. 858,879; July 2, 1907.)

PEAT MACHINE—Machine for Forming and Compressing Peat, etc., Into Blocks or Cakes. Matthew C. Sharpneck, Boston, Mass., assignor to American Peat Machinery Co., Portland, Me., a Corporation of Maine. (U. S. No. 858,352; June 25, 1907.)

PEAT-MACHINE. Matthew C. Sharpneck, Boston, Mass., assignor to American Peat Machinery Co., Portland, Me., a Corporation of Maine. (U. S. No. 858,353 and 858,354; June 25, 1907.)

PEAT MACHINERY. J. Stevens and A. H. Hughes, London, England. Improved press of the filter type for compressing peat into blocks and removing moisture. (Brit. No. 11,621 of 1906; June 15, 1907.)

SCREENING—Screen-Scraper For Coal Tipples. William E. Thoenen, McMechen, W. Va. (U. S. No. 858,312; June 25, 1907.)

COPPER

COPPER EXTRACTION. L. Jumeau, Paris, France. In the inventor's process for extracting copper, dissolving precipitated cuproso-cupric sulphite in ammonia and electrolyzing the solution. (Brit. No. 590 of 1907; July 6, 1907.)

COPPER WIRE. S. O. Cowper-Coles, London, England. In the inventor's process for producing copper wire by electrolytically depositing copper on a revolving mandrel on which spiral grooves are scratched, methods of obviating the crystalline structure of the unwound strips. (Brit. No. 21,349 of 1906; June 15, 1907.)

PYRITIC SMELTING—Process of Pyritic Smelting. Henry Arden, San Diego, Cal. (U. S. No. 860,512; July 16, 1907.)

SOLUTION TREATMENT. L. Jumeau, Paris, France. Treating copper solutions with sulphurous acid, and reducing the copper from the sulphite so formed by the action of sulphuric acid. (Brit. No. 414 of 1907; July 6, 1907.)

GOLD AND SILVER

ALLOY. S. O. Cowper-Coles, London, England. An improved method of making standard silver in which zinc only is the alloying metal. (Brit. No. 28,587 of 1907; June 21, 1907.)

IRON AND STEEL

BLAST-FURNACE, TRAP FOR FURNACE-TOP CONSTRUCTION. Samuel E. Hitt and George M. Black, Cleveland, Ohio. (U. S. No. 858,182; June 25, 1907.)

CUPOLA - CHARGING MECHANISM. Sherwood S. Knight, Birmingham, Ohio. (U. S. No. 858,004; June 25, 1907.)

FLUX FOR IRON. Joseph Davies, Birmingham, England. (U. S. No. 858,582; July 2, 1907.)

IRON TUBES. S. O. Cowper-Coles, London, England. In the production of iron tubes electrolytically direct from crude iron or iron ore, keeping the electrolyte charged with iron oxide by means of stirrers, the effect being to obtain a brighter and less spongy deposit. (Brit. No. 28,897 of 1906; June 15, 1907.)

PERMEABLE IRON. R. A. Hadfield, Sheffield, England. Improvements in the inventor's iron of low hysteresis action and high permeability, with the object of increasing its malleability. (Brit. No. 11,974 of 1906; June 21, 1907.)

ROLLING MILLS—Feed-Table for Rolling Mills. Sigmund V. Huber, Pittsburg, Penn. (U. S. No. 857,283; June 18, 1907.)

ROLLING MILLS—Guiding Device for Rolling Mills. Karl Koziel, Lugansk, Russia, and Heinrich Becker, Ruhrort, Germany. (U. S. No. 859,390; July 9, 1907.)

SMELTING IRON SANDS. H. W. Lash, Cleveland, Ohio. A method of smelting iron sands by mixing with finely divided pig-iron and fuel and reducing in a furnace. (Brit. No. 387 of 1907; June 15, 1907.)

TEMPERATURE REGULATION. J. Flohr, Dudelange, Luxemburg. In the basic bessemer process, the use of balls of iron scale for the purpose of decreasing the temperature during dephosphorizing. (Brit. No. 16,440 of 1906; June 21, 1907.)

TEMPERING DEVICE. R. E. B. Crompton, London, England. A machine for taking small steel articles out of muffle furnaces and plunging them into the hardening bath. (Brit. No. 20,445 of 1906; June 20, 1907.)

NICKEL

ORE TREATMENT—Treatment of Ores Containing Nickel. Ralph W. E. MacIvor, London, England, assignor to

Metals Extraction Corporation, Limited, London, England, a Corporation. (U. S. No. 859,776; July 9, 1907.)

RECOVERY OF NICKEL—Process of Recovering the Nickel Contained in Basic Nickel Precipitates. Herbert H. Dow and Walter S. Gates, Midland, Mich., and Arthur E. Schaefer, Cleveland, Ohio, assignors by mesne assignments, to Ontario Nickel Co., Ltd., Worthington, Canada, a Corporation of Canada. (U. S. No. 857,927; June 25, 1907.)

RARE METALS

VANADIUM ALLOYS—Process of Producing Vanadium and its Alloys. Frederick M. Becket, Niagara Falls, N. Y., assignor to Electric Metallurgical Co., a Corporation of West Virginia. (U. S. No. 858,325; June 25, 1907.)

SULPHUR AND PYRITES

PYRITES BURNING. United Alkali Company, and J. Morton, Liverpool, England. For removing dust from the gases coming from pyrites burners, placing magnetised plates across the flue, which attract the dust. (Brit. No. 17,461 of 1906; July 6, 1907.)

SULPHUR BURNING. T. A. Clayton, London, England. In sulphur burning furnaces, an improved method for regulating the air admission valve. (Brit. No. 16,340 of 1906; June 15, 1907.)

TIN

TIN EXTRACTION—Process of Extracting Tin From Tin Ores. Heinrich Brandenburg, Kempen-on-the-Rhine, Germany. (U. S. No. 859,184; July 2, 1907.)

TIN EXTRACTION FROM IRON—Process For Extracting Tin From Iron Containing Tin Products. Heinrich Brandenburg, Kempen-on-the-Rhine, Germany. (U. S. No. 859,594; July 9, 1907.)

ZINC

ELECTRODE MANUFACTURE. H. Rollet, London, England. Making zinc poles for electric batteries by extending the metal cold at high pressure through a small die. (Brit. No. 16,159 of 1906; July 6, 1907.)

GALVANIZING. F. W. Gauntlet and the Sherardising Syndicate, London, England. In the process for galvanizing or otherwise coating iron articles with metals by heating the iron in contact with the powdered metal, improvements consisting in the addition of inert bodies such as powdered silica to the powdered metal. (Brit. No. 9959 of 1906; June 29, 1907.)

ZINC DISTILLATION FURNACES. P. Schmidt and A. Desgraz, Germany. In gas fired zinc distilling furnaces, improved arrangements of the gas inlets so as to be able to regulate the temperature more satisfactorily. (Brit. No. 11,191 of 1906; June 15, 1907.)

ORE DRESSING

CLASSIFIER. R. E. Trotter, Aigiers. A classifier for minerals in which the physical shape of the particles is made use of in separating particles of the same specific gravity and volume. (Brit. No. 17,081 of 1906; July 6, 1907.)

CRUSHER. Thomas L. Sturtevant, Quincy, and Thomas J. Sturtevant, Wellesley, Mass., assignors to Sturtevant Mill Co., Portland, Me., a Corporation of Maine. (U. S. No. 859,348; July 9, 1907.)

CRUSHERS—Hammer for Crushers and Pulverizers. Milton F. Williams, St. Louis, Mo., assignor to Williams Patent Crusher and Pulverizer Co., St. Louis, Mo., a Corporation of Missouri. (U. S. No. 858,772; July 2, 1907.)

CRUSHING. W. H. Baxter, Leeds, England. A combined plant for breaking ore or stone and removing the dust and fines formed. (Brit. No. 5070 of 1907; June 15, 1907.)

JIG. W. Sauerbney, Cunnorsdorf, Germany. A jig for dressing ores in which the screen on immersion in water travels in a slanting direction, so that the light matter shall be more easily removed over the side. (Brit. No. 407 of 1907; June 15, 1907.)

MAGNETIC SEPARATOR. M. Ruthenburg, London, England. A magnetic separator on which the powdered ore is carried on a belt between the pole surfaces of a magnetic field having moving magnetic poles one of which removes the magnetic material from the belt. (Brit. No. 24,422 of 1906; June 15, 1907.)

MAGNETIC SEPARATOR. S. O. Cowper-Coles, London, England. A magnetic separator on which centrifugal force is combined with a magnetic field, for separating metallic ores from gangue or from non-magnetic ores. (Brit. No. 1085 of 1907; June 15, 1907.)

ORE CONCENTRATING AND SEPARATING MACHINE. John M. Callow, Salt Lake City, Utah, and James W. Neill, Butte, Mont. (U. S. No. 859,483; July 9, 1907.)

ORE-CONCENTRATING MACHINE. Albert H. Stebbins, Little Rock, Ark. (U. S. No. 859,024; July 2, 1907.)

ORE-CONCENTRATOR. Christoffer A. Christensen, Oretown, Ore. (U. S. No. 859,433; July 9, 1907.)

ORE-CONCENTRATOR. John C. Tatman, Denver, Colo. (U. S. No. 860,500; July 16, 1907.)

ORE CRUSHER AND PULVERIZER. Adolph J. Petter, Los Angeles, Cal. (U. S. No. 859,835; July 9, 1907.)

ORE-GRANULATOR. Howard S. Bailey, Denver, Colo., assignor to Mining, Milling and Machinery Manufacturing Co., Denver, Colo., a Corporation of Colorado. (U. S. No. 858,495; July 2, 1907.)

ORE SEPARATOR—Combined Ore Separator and Amalgamator. Charles T. Heisel, Cleveland, Ohio. (U. S. No. 858,456; July 2, 1907.)

ORE-SEPARATOR. George W. Wood, Weatherby, Mo. (U. S. No. 859,589; July 9, 1907.)

ORE-SLIMER. Peter H. Craven, Spokane, Wash. (U. S. No. 858,262; June 25, 1907.)

ORE WASHER OR CONCENTRATOR. Enos A. Wall, Salt Lake City, Utah. (U. S. No. 859,354; July 9, 1907.)

PULVERIZING MILLS—Air-Separator For Pulverizing and Grinding Mills. James W. Fuller, Jr., Catsaquia, Penn. (U. S. No. 857,988; June 25, 1907.)

PULVERIZING OR GRINDING MILL. James W. Fuller, Jr., Catsaquia, Penn. (U. S. No. 857,932; June 25, 1907.)

SCREENING-MACHINE. William A. Kidney, Butte, Mont. (U. S. No. 859,669; July 9, 1907.)

SEPARATION—Method of Electrical Separation. Henry A. Wentworth, Lynn, Mass., assignor to Huff Electrostatic Separator Company, Boston, Mass., a Corporation of Maine. (U. S. No. 859,998; July 16, 1907.)

SEPARATOR. Newton Brothers, Derby, England. An electro magnetic separator, especially designed for removing iron compounds from china clay or other materials used in the manufacture of china and earthenware. (Brit. No. 13,845 of 1906; June 29, 1907.)

STAMP-MILL. James E. Brooks, Crawfordsville, Ore., assignor of one-half to James C. Munkers, Crawfordsville, Ore. (U. S. No. 859,044; July 2, 1907.)

METALLURGY—GENERAL

ELECTRIC-FURNACE PROCESS OF MAKING LOW-CARBON METALS OR ALLOYS. Frederick M. Becket, Niagara Falls, N. Y., assignor to Electro Metallurgical Co., a Corporation of West Virginia. (U. S. No. 858,780; July 2, 1907.)

METALLIC OXIDES. H. Jaeger, Kalk, Germany. Apparatus for producing oxides of metals, particularly stannic oxide, by forcing the molten metal in the form of a spray by means of superheated steam and thus bringing it into contact with air. (Brit. No. 15,591 of 1906; June 15, 1907.)

ORE REDUCTION—Method of Carry-

ing Out Metallurgical Reduction and Melting Processes. Albert J. Petersson, Alby, Sweden. (U. S. No. 858,622; July 2, 1907.)

ORE REDUCTION—Process of Effecting Chemical Reductions and Producing Metals and Alloys. Frederick M. Becket, Niagara Falls, N. Y., assignor to Electro Metallurgical Co., a Corporation of West Virginia. (U. S. No. 858,329; June 25, 1907.)

ORE REDUCTION—Process of Electrically Reducing Oxide Ores. Albert J. Petersson, Alby, Sweden. (U. S. No. 858,621; July 2, 1907.)

ORE-ROASTING PROCESS. Arthur R. Wilfley, Denver, Colo. (U. S. No. 859,420; July 9, 1907.)

REFINING—Electrolytically Refining Metals. Anson G. Belts, Troy, N. Y. (U. S. No. 857,378; June 18, 1907.)

SMELTING SULPHIDE ORES. J. T. Carrick and S. Pattinson, Johannesburg, So. Africa. In smelting sulphide ores, treating the matte produced, with dilute acid for the production of sulphuretted hydrogen, which is subsequently used as a fuel in the smelting process. (Brit. No. 22,166 of 1906; July 6, 1907.)

MINING MACHINERY AND APPARATUS

BELT CONVEYER. Edward G. Thomas, Brookline, Mass. (U. S. Nos. 857,771 and 857,772; June 25, 1907.)

BELT-CONVEYER IDLER. Ferdinand F. Waechter, Philadelphia, Penn., assignor to Link-Belt Co., Chicago, Ill., and Philadelphia, Penn., a Corporation of Illinois. (U. S. No. 857,870; June 18, 1907.)

BELT CONVEYERS—Carrying-Roll for Belt Conveyers, Etc. Raymond W. Dull, Aurora, Ill., assignor to Stephens-Adamson Mfg. Co., a Corporation of Illinois. (U. S. No. 857,610; June 25, 1907.)

CONVEYING APPARATUS—Combination Hoist, Aerial Tramway, and Automatic Dumping Device. Peter M. MacKaskie, Butler, Nev., assignor of one-half to Key Pittman, Tonopah, Nev. (U. S. No. 858,814, 858,815 and 858,816; July 2, 1907.)

DEEP BORING APPARATUS. G. Koerner, Nordhausen, Germany. An apparatus for use in deep boring for the object of registering the deviation in the bore holes from the vertical. (Brit. No. 7797 of 1906; July 6, 1907.)

DREDGES—Apparatus for Moving Dredges. William H. Silver and Charles A. Bunyan, Hammond, Ill. (U. S. No. 858,033; June 25, 1907.)

HOISTING APPARATUS—Safety Appliance for Hoisting Mechanisms. William F. Buch, Cleveland, Ohio. (U. S. No. 857,382; June 18, 1907.)

HOISTING APPARATUS—Safety Mechanism for Hoisting or Hauling Apparatus for Mines. Ragnvald Jensen, East Rand, Transvaal. (U. S. No. 857,286; June 18, 1907.)

MINE-DOOR-CONTROLLING APPARATUS. Amos S. Robinson, Nelsonville, Ohio. (U. S. No. 859,522; July 9, 1907.)

MINE PROPS. F. Nellen and A. Voight, Essen, Germany. Adjustable mine props made of artificial stone. (Brit. No. 7103 of 1907; July 6, 1907.)

MINE PROPS REMOVAL. E. Barber, Rugeley. Improved apparatus for removing mine props. (Brit. No. 13,469 of 1906; July 6, 1907.)

MINER'S CANDLE-HOLDER. John C. F. Woodworth, Silverbell, Ariz. (U. S. No. 859,277; July 9, 1907.)

MINER'S CANDELESTICK. Henry Laukka, Virginia, Minn., assignor to Otto A. Poirier, Virginia, Minn. (U. S. No. 859,672; July 9, 1907.)

MINER'S-LAMP BRACKET. Augustus H. Rohleder, Ashland, Ohio. (U. S. No. 859,844; July 9, 1907.)

MINER'S-LAMP BRACKET. Charles C. Kelly, Belle Ellen, Ala. (U. S. No. 860,033; July 16, 1907.)

MINER'S-LANTERN HOLDER. Thomas R. Jones, Wilkes-Barre, Penn. (U. S. No. 860,097; July 16, 1907.)

ROCK-DRILL. John B. Marshall, Broken Hill, New South Wales, Australia. (U. S. No. 858,195; June 25, 1907.)

ROCK DRILL BITS. N. Dunstan, Redruth, England. Improved machine for forging and sharpening bits used in rock drills. (Brit. No. 13,771 of 1906; June 29, 1907.)

ROCK DRILL OPERATION—Means for Supplying Explosive Vapors for Operating Rock-Drills. Otho C. Duryea, Brooklyn, N. Y., assignor to National Gas Drill Co., a Corporation of California. (U. S. No. 858,586; July 2, 1907.)

SAFETY LAMP. J. Galliford, Manchester, England. Improved miner's safety lamp which will enable the lamp to be used in inspecting the roof of a working. (Brit. No. 16,755 of 1906; July 6, 1907.)

SAFETY LAMPS. E. A. Hailwood, Leeds, England. An improved wick tube for miner's safety lamps. (Brit. No. 15,097 of 1906; June 29, 1907.)

SAFETY LAMPS. O. M. Muller, Gelsenkirchen, Germany. An improved magnetically releasable locking device for miners' safety lamps. (Brit. No. 5849 of 1907; June 15, 1907.)

WIRE-ROPE-TRANSMISSION DEVICE. Edward Y. Knapp, Eureka, Cal. (U. S. No. 859,670; July 9, 1907.)

METALLURGICAL MACHINERY AND APPARATUS

AMALGAMATING TABLE—Shaking Amalgamating Table. George T. Hood and William M. Cochrane, Johannesburg, Transvaal. (U. S. No. 860,474; July 16, 1907.)

CASTING METAL SHEETS—Apparatus for Casting Metal Sheets. John F. Miller, Trail, British Columbia, Canada, assignor of one-half to Walter H. Alldridge, Trail, British Columbia, Canada. (U. S. No. 857,885; June 25, 1907.)

CRYSTALLIZATION TANKS. J. H. Dennis and Co., Liverpool, England. Tanks for crystallizing sulphate of copper built of brickwork lined with suitable tiling, in place of the usual wooden tanks lined with lead. (Brit. Nos. 14,278 and 14,279 of 1906; June 15, 1907.)

ELECTRODEPOSITION—Apparatus for Electrolytic Deposition of Metals. Herbert C. Harrison, London, and Joseph Day, Weston-super-Mare, England; said Day assignor to said Harrison. (U. S. No. 858,341; June 25, 1907.)

PEBBLE-MILL LINING—Lining for Pebble Mills. Max F. Abbé, New York, N. Y. (U. S. No. 858,129; June 25, 1907.)

RETORT CHARGING—Machine for Charging Retorts. Leotis W. Kirk, Pueblo, Colo., assignor of one-half to William L. Hartman, Pueblo, Colo. (U. S. No. 857,074; June 18, 1907.)

TANKS FOR ELECTROLYTIC WORK—Method of Lining Tanks for Electrolytic Work. John F. Miller, Trail, British Columbia, Canada. (U. S. No. 857,886; June 25, 1907.)

TEMPERATURE MEASUREMENT. F. L. Morse, New York, N. Y. Improved apparatus for judging temperatures by the color of metals undergoing hardening and annealing. (Brit. No. 16,248 of 1906; July 6, 1907.)

TUBE MILLS. A. Smart, Erith, London, England. In tube mills, forming the grinding surface of a corrugated form, so as to prevent the pebbles or balls from sliding. (Brit. No. 1270 of 1907; June 21, 1907.)

FURNACES

ELECTRIC FURNACE. Paul L. T. Héroult, La Paz, France, assignor to Societe Electro-Metallurgique Francaise, Froges, Isère, France. (U. S. No. 858,718; July 2, 1907.)

ELECTRIC FURNACE. S. O. Cowper-Coles, London, England. An improved electric furnace for smelting of ores or the calcination of cement. (Brit. No. 596 of 1907; June 21, 1907.)

ELECTRIC FURNACE CHARGING—Method of and Means for Charging Electric Furnaces. William H. Huffman, Niagara Falls, N. Y., assignor to International Acheson Graphite Co., Niagara Falls, N. Y., a Corporation of New Jersey. (U. S. No. 860,477; July 16, 1907.)

ELECTRIC-FURNACE PROCESS. Franz von Kugelgen and George O. Howard, Holcombs Rock, Va. (U. S. No. 858,400; July 2, 1907.)

ELECTRIC FURNACES—Heating-Bar for Electric Furnaces. Archibald L. Brougham, New York, N. Y. (U. S. No. 857,381; June 18, 1907.)

HEATING-FURNACE. Johnson Hughes, Wissahickon, Penn. (U. S. No. 857,285; June 18, 1907.)

Personal

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

J. H. Robeson, of Clear Creek county, Colo., has returned from a visit to Parral, Mexico.

D. N. Harper, of Paris, France, has been in Gilpin county, Colo., looking after mining interests.

H. P. Tweed has returned to Denver from Arizona, and is on professional business in Nevada.

Clancey M. Lewis, of South Bellingham, Wash, has taken offices at No. 316 Pacific Block, Seattle.

C. L. Logue, now with the Western Ore Purchasing Company, Millers, Nev., spent last week in Goldfield.

W. R. Ingalls, editor of the JOURNAL, left Denver a few days ago for Salt Lake City and the Pacific Coast.

J. W. Astley, of Victoria, B. C., is at Georgetown, Colo., examining mining property for English clients.

E. A. Reser, of New York City, is in Colorado, looking over mining interests in Gilpin and Boulder counties.

General Manager McKeever, of the Copper Range Consolidated Company, is at the property, in Michigan.

W. W. Degge, president of the Wellington Association, of Boulder, Colo., has left on a visit to Eastern points.

Richard M. Atwater, Jr., of Helena, Mont., has returned from South America, after an extended professional trip.

F. E. Himrod, of New York city, has returned home after a visit to his holdings, in Clear Creek and Gilpin counties, Colo.

Anthony McGill has been appointed by the Canadian Government as chief analyst of the Inland Revenue department, at Ottawa.

W. T. Hedges, an English mining engineer, is engaged in making an inspection of the Cobalt and adjoining mining areas.

R. H. Hewitt, president of the Magnus Metal Company, has been elected a director of the National Copper Bank, New York.

Edward K. Judd, mining engineer, of New York, is in Cobalt, Ont., examining some mining property for New York parties.

E. C. Lindemann, of Boulder, Colo., is making an examination of mines in the Western States, in the interests of investors.

H. W. Hardinge, of New York, has left for Canada and an extended visit to Colorado and the West on professional business.

M. N. MacLeod has been appointed

general manager of the Canadian Northern Railway system, with headquarters at Winnipeg.

Lafayette Hanchett, of Salt Lake City, Utah, has been in Clear Creek county, Colo., looking over mining and milling properties.

Forbes Rickard, of Denver, has been making examination of Gilpin county, Colo., properties in the interests of eastern capitalists.

Henry Snell, superintendent of the Arizona Commercial Company, and of the Superior & Boston, is in the Lake country, visiting his parents.

Albert H. Fay has returned from Alaska, and is now mining engineer at the barium and zinc works of John T. Williams & Sons, Bristol, Tenn.

E. J. Wilcox, manager of the Waldorf properties in Clear Creek county, Colo., has returned from a visit to Arizpe, near Cananea, Mexico, to examine mines.

Francis A. Thomson, head of the department of mining at the State College of Washington, is on a tour through the mining districts of East and West Kootenay, B. C.

Eugene Coste returned to Toronto this week from Alberta and Saskatchewan, where he has been engaged in exploration for oil in the interests of the Canadian Pacific Railway.

Adolph Hirsh, secretary and treasurer of the Diamond Drill Carbon Company, of New York, has left for a three months' visit to London, Eng., going from there to Brazil.

Louis D. McCall, of Chicago, Ill., president of the Jefferson-Calhoun and Calhoun Tunnel Mining companies, operating in Gilpin county, Colo., has been visiting these properties.

S. A. Worcester has completed the design and installation of a three-ton over-balanced-skip hoisting plant for the Findley mine, shaft No. 1, Independence, Colo., and is now at Victor.

A. L. Queneau, superintendent of smelting works with the Zinc Corporation, Ltd., has resigned to accept a similar position with the Bartlesville Zinc Company, Bartlesville, Okla.

C. C. Whiting, of New York city, president of the Whiting Mining Company, has been at Georgetown, Colo., looking after interests in the Terrible property, in which Senator Elkins is interested.

C. H. MacMillan, late general superintendent of the plant of the Dominion Iron & Steel Company, of Sydney, N. S., has resigned his position and is succeeded by W. C. Mitchell, of Chesterfield, England.

G. F. Stevenson, of Los Angeles, Cal., part owner of the Hahn's Peak placers, in Routt county, Colo., is looking over the property accompanied by C. Jaines and D. N. Diggles, capitalists, of San Francisco, Cal.

Reginald Francis, an English mining engineer, arrived last week from Swansea, Wales, on his way to Cananea, Sonora, Mex., where he will examine the properties of the Pennsylvania & Cananea Copper Company in the interests of English capitalists.

W. Fischer Wilkinson, mining engineer, of London, arrived in New York July 21, and will spend some time visiting mines in this country and Mexico. He is accompanied by D. O. Caldecott, who is well known for his long and active service in the mines of the Transvaal.

F. E. Butcher, for several years manager of the foreign sales department of the Kilbourne & Jacobs Manufacturing Company, Columbus, Ohio, has taken an interest in the American Concentrator Company, Joplin, Mo., becoming vice-president and general manager.

Prof. C. Kenneth Leith, who has for many years been connected with the U. S. Geological Survey, and wrote the Mesabi range monograph, is on that range this summer, revising his report and the accompanying map, for publication in the final volume of the Lake Superior geology, which is to come out next year.

Dr. David T. Day has been relieved of the charge of the Division of Mining and Mineral Resources of the United States Geological Survey; his successor being Edward W. Parker, long connected with the division as statistician. Dr. Day will devote his entire time to the study of the petroleum resources of the United States.

Obituary

Benjamin Corey, of San Francisco, Cal., well known in mining circles in Phoenix, Ariz., was killed at Manchester, N. H., on July 4, by being thrown from a carriage. He was 65 years old.

Dr. Edwin Gilpin, deputy Commissioner of Works and Mines, of Nova Scotia, died at Northwest Arm, near Halifax, on July 10, as the result of a paralytic stroke. He was appointed provincial inspector of mines in 1879 and was made deputy commissioner in 1886. He was regarded as one of the best authorities on mining in Canada.

Angelo Heilprin, head of the Sheffield Scientific School of Yale, for seven years president of the Geographical Society, of Philadelphia, explorer and author of many treatises on volcanoes and other scientific subjects, died in Philadelphia on July 17, from tropical fever which he had contracted while exploring in South America. Professor Heilprin won fame as an explorer. He was born in 1853 in Hungary and was brought to this country at an early age. He took up the study of natural science and devoted his attention particularly to paleontology and geology. He visited the Klondike and Alaska in 1898 and 1899. In 1891 he accompanied

Lieut. Peary to the ice fields of Greenland and studied the ice-cap and its relations to the glacial period, and later headed a Peary relief expedition. He studied the volcanoes of Northern Africa and of Mexico, and was the first to prove that Orizaba is higher than Popocatepetl. His work, "Mont Pelee and the Tragedy of Martinique," records his observations on that famous geologic disturbance.

Societies and Technical Schools

Lake Superior Mining Institute—Notices have been sent out postponing indefinitely the annual meeting which was to have been held at Duluth July 24. The idleness of the ore docks and the suspension of all mining operations on account of the strike is given as the reason for the postponement.

McGill University—Plans have been completed for the construction of the new engineering building at the university, Montreal, to replace that destroyed by fire last April. It will be somewhat larger than the one destroyed and in every way in keeping with the first-class equipment to be provided and thoroughly fire-proof. The cost will be about \$275,000. The architect is Prof. Percy E. Nobbs, of McGill University and the contractors Byers & Anglin, Montreal.

Industrial

The D. T. Williams Valve Company has issued for free distribution three pamphlets and a new catalog, describing the engineering specialties manufactured by that firm.

The branch office of the Sullivan Machinery Company at San Francisco, of which Howard I. Walsh is manager, has been removed from No. 319 Howard street to No. 26 Fremont street.

At the annual meeting of the stockholders of the Virginia-Carolina Chemical Company, held in Jersey City, N. J., the retiring board of directors was re-elected, with the exception of J. B. Dennis and E. G. Statesburg, who were succeeded by L. Oudin and W. N. Reynolds.

The Isthmian Canal Commission has ordered 24 Sullivan class Y-8 channelers for channeling the walls of the canal when it passes through rock. The work includes almost all of the "wet prism" in the Culbra division, 9 miles long, and also the walls of the locks at La Boca and Mira Flores.

The Minneapolis Steel and Machinery Company, of Minneapolis, Minn., has established an office in the Phoenix building, Butte, Mont., under the management of J. E. Lanning. The firm manufactures engines, gas producers, coal-handling machinery, ore-conveying devices and other equipment.

The East Pittsburg works of the Westinghouse Electric and Manufacturing Company is turning out 16 locomotives for coal mines in West Virginia and Kentucky, one for an iron mine in Sweden, another for a power company in the State of Washington, and is constructing a complete electric motor equipment for a phosphate mine in Florida.

The Webb City & Cartersville Foundry and Machine Works is a consolidation of five plants manufacturing mining machinery in the Joplin district, Mo. The firms combined were: Webb City Iron Works, Cartersville Foundry and Machine Works, Jasper County Foundry and Machine Works, with one plant at Joplin and another at Cartersville, and Oronogo Foundry Company. The officers are: W. R. Caulkins, president; T. F. Coyne, vice-president; H. B. Owens, secretary and treasurer; W. G. Bryant, general manager.

In the United States Circuit Court for the northern district of New York, Judge Ray handed down an opinion in favor of the General Electric Company in its suit to restrain Corliss, Coon & Co., of Cohoes, N. Y., from further infringement of Eickemeyer patent No. 677,308, in the use of some induction motors manufactured by the Allis-Chalmers Company. The feature of these motors which formed the basis of the suit, was the relation between the number of slots in the field and the number of slots in the armature whereby all dead points or locking positions are eliminated from the motor. The court holds that the patent is valid, and is infringed by the defendants.

Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

Scully Steel and Iron Company, Chicago, Ill. Stock List. Pp. 146, illustrated, paper, 4½x7 in.; July and August, 1907.

American Spiral Pipe Works, Post-office Box 485, Chicago, Ill. Forged Steel Pipe Flanges. Pp. 94, illustrated; paper, 8x10 in.

Hendryx Electro Cyanide Company, Denver, Colo. Catalog No. 4. Hendryx Process. Pp. 20, illustrated, paper, 5½x8½ inches.

Ingersoll-Rand Company, 11 Broadway, New York. Bulletin No. 2010. "Crown" Pneumatic Hammers. Pp. 24, illustrated, paper, 6x9 in.

American Electric Furnace Company, 45 Wall street, New York. Bulletin No. 1. Electric Furnaces. Pp. 12, illustrated, paper, 7½x10 in.; June, 1907.

The Westinghouse Machine Company, East Pittsburg, Penn. The Westinghouse Storage Battery. Pp. 50, illustrated; paper, 4½x6 in.

Ore Reduction Company, Limited, Toronto, Canada. Centrifugal Concentrating or Separating System. Pp. 8, illustrated, paper, 6x9 inches.

Warren Electric Manufacturing Company, Sandusky, Ohio. Bulletin No. 30. Revolving Feed Alternators. Pp. 12, illustrated, paper, 8x11 in.; May, 1907.

Harrison Safety Boiler Works, Seventeenth street and Alleghany avenue, Philadelphia, Penn. "Saving Exhaust Steam Under Difficulties." Folder, illustrated, paper, 8½x11 in.

Jacobson Machine Manufacturing Company, Warren, Pa. Bulletin "C." The Jacobson Gas and Gasoline Engines for Stationary and Portable Purposes. Pp. 16, illustrated, paper, 6x9 in.

Joshua Hendy Iron Works, San Francisco, Cal. Panoramic view of San Francisco, Cal., taken from the vicinity of Seventh and Markets streets immediately before and after the fire, April 18, 1906. Two engravings, 27x8 in.

A. Wissler Instrument Works, 601-615 North Broadway, St. Louis, Mo. High Grade Engineering, Surveying, Mining, Scientific and Recording Instruments and Supplies. Contains numerous tables and data. Price \$1. Pp. 166, indexed, illustrated; paper, 5x8 in.

Fort Wayne Electric Works, Fort Wayne, Ind. Bulletin No. 1094. Belted Direct-Current Generators. Type LF. Pp. 8, illustrated, paper, 8x10½ in.; April 15, 1907. Bulletin No. 1095. Enclosed Alternating-Current Multiple Arc Lamps 104-Volt, Type A C M, Form C. Pp. 8, illustrated, paper, 8x10½ in.; May 10, 1907. Bulletin No. 1096. Type A Transformers. Pp. 8, illustrated, paper, 8x10½ in.; April 25, 1907.

Construction News

Lawrence County, South Dakota—The Success Mining Company has decided to build a mill on its property near Roubaix.

Central City, Colorado—The Grand Central Mining Company is about to install a new compressor plant. Peter F. Daly, Central City, Colo., is superintendent.

Silver Creek, Pennington County, South Dakota—The Cordelia Mining Company is considering plans for a mill to treat practically free-milling ore. L. M. Kearny is manager.

Russell Gulch, Colorado—An electrical plant is to be installed on the Iron Duke property by Louisiana and Mississippi capitalists. A. H. Heller, Central City, Colo., is manager.

Black Hawk, Colorado—A new company is reported to be in process of formation for the purpose of erecting a large concentrating plant. H. W. Kane, Central City, Colo., is conducting the negotiations.

Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives
at Denver, Salt Lake City, San Francisco and London

REVIEWS OF IMPORTANT EVENTS

San Francisco

July 17—The exceptionally rich strikes of ore in the Tightner mine, in Sierra county, are having a good effect in the region for 20 miles around Alleghany. Most of the ore is of the "candle box" or specimen variety, and pockets of the richest kind of gold ore have been taken out.

In the same county the Reliance and Keystone gravel claims covering nearly 2000 ft. of the famous Keystone channel of Chipp's Ridge, have been leased by Francis De Lawney, and the work of extending the tunnel begun some months ago, is to be crowded as fast as men can be secured to do the work. The mine is owned by M. W. Mather, of the Croesus Mining Company, and Henry North.

The Minarets region, in the high Sierra of Madera county, is again attracting attention of prospectors. There is deep snow there still, and the work is difficult.

Some discoveries have been made in the cinnabar district, on Bald mountain, which is about 60 miles east of Lake City, Modoc county. Several new locations have been made which yield ore of high grade.

In addition to the closing down of the big gold mines at Angels, in Calaveras county, the largest copper mine in the county, has also discharged 80 men and quit work. This is the Union mine, at Copperopolis, which within the past year, has established extensive reduction works, and begun developments of great extent. The smelter will also stop work.

Some of the dredging companies at Oroville have been asking for a reduction of taxation assessment owing to the damage done by the spring floods. One dredge was virtually destroyed and two more were capsized and badly damaged. The Board of Equalization refused to make any reduction.

The first shipment of oil through the Standard Oil Company pipe line completed recently, will probably be run into the Midway fields, Kern county, within a week. The main line is of 8-in. pipe, while the branch lines are 6 in.

Over about Horse Mountain, the new copper district in the east central part of Humboldt county, there is a great deal of active work in locating copper claims and in opening and developing that section. Several companies have been formed to prospect for copper.

The new director of the mint, Frank A. Leach, formerly superintendent of the U. S. mint, at San Francisco, was for many years a publisher and editor of

newspapers at Vallejo and Oakland, California. He has been interested in drift mines in Placer county for many years, and owns also large copper interests in the new districts in Trinity county.

The new camp of Quail Springs, in San Bernardino county, is the latest scene of an important strike of silver-copper ore. The new strike is about one mile from the Silver King group of the Kennedy Brothers.

The Oustomah property, including the original Pennsylvania mine, has been sold to the Hayes Brothers, of San José, and is to be put in working order at once. Altogether the purchase includes some 5000 feet on the vein. Another sale in the same vicinity is that of the Norambagua mine to Pittsburg men, who will install a complete pumping and hoisting plant, and then devote its energies to sinking and opening up new ground. The mine has a fine record as a producer.

Two old mines, long idle, about to be reopened, are the Belle Union, near the North Star, at Grass Valley, Nevada county, and the Brush Creek, on Woodruff creek, near the Mountain House, Sierra county. The Brush Creek is to have an 800-ft. tunnel to drain it. At one time, years ago, the mine paid handsomely but the owners were driven out by water. The shaft is about 250 ft. deep.

Salt Lake City

July 18—The United Mercur Gold Mines Company has been organized to operate and develop a group of claims including the Ingot mine, adjoining, and in the vicinity of the Consolidated Mercur Gold Mines Company's mine. Samuel Newhouse is named as president.

F. Augustus Heinze's representatives have closed a deal for the purchase of a smelter site about two miles south and west of the old Garfield Beach bathing resort on the south shores of the Great Salt lake, and within four miles of the smelter operated at Garfield by the American Smelting and Refining Company. The property purchased, it is understood, will be conveyed to the Miners' Smelting Company, recently organized under the laws of the State of Maine, and in which Mr. Heinze is a controlling spirit. The proposed plant will be built with the view of entering into active competition with the American Smelting and Refining Company, for the treatment of all classes of ore in addition to handling the output from the properties operated by the Bingham Consolidated Mining and

Smelting Company, in Bingham and Tintic; the Ohio Copper Company, in Bingham; Silver King Coalition, at Park City; Western Utah Copper, in the western part of Tooele county. The initial unit will handle, it is claimed, at least 2000 tons of ore daily.

The Consolidated Mercur Gold Mines Company is opening up the old Brickyard mine, one of the properties operated successfully by Captain DeLaMar, when he owned the Golden Gate mines in Mercur. A recent sampling has revealed extensive bodies of developed ore in the mine. All of the equipment for the new slimes plant should arrive by the middle of August. A portion of the plant is being tried out.

The consolidation of the Star Consolidated and Black Jack mines, in the Tintic district, has been consummated. The capital stock of the Black Jack is to be doubled, and the new issue is to go to the present shareholders of the Star Consolidated.

The initial dividend of the Silver King Coalition Mines Company, 3 per cent. of the capital stock, or \$185,000, has been posted for payment on July 31.

The fifth steam shovel ordered by the Utah Copper Company, at Bingham, has been placed in commission, and the fourth section of the new concentrating mill, at Garfield, has been started. The latter is now handling 2000 tons of ore daily, while the Copperton mill, in Bingham cañon is treating 1000 tons. On this basis the Utah company is producing from 30,000,000 to 35,000,000 lb. of copper annually.

Denver

July 19—On July 17 a disastrous cave-in occurred in the Cripple Creek district, this time fortunately without loss of life. It took place on Battle mountain, at the Stratton's Independence mine, at a point between the main shaft and the Portland ground. Damage to the extent of about \$50,000 was done, partly to the Victor water system. More than 500 ft. along the surface sank, from 6 to 12 ft., and No. 2 shaft house was wrecked.

At its annual meeting, held on July 15, the Mary McKinney Gold Mining Company passed the quarterly dividend, because the property had been shut down for several weeks, made necessary by the need of repairs and new machinery. There is \$50,000 in the treasury of which \$20,000 has been set aside for subscription to the drainage tunnel fund.

The annual report of the Elkton Con-

solidated Gold Mining Company, submitted to the stockholders on July 15, shows profits for the year of \$330,000, out of which nearly \$200,000 was paid in dividends. The former officers and directors were re-elected. It is expected that the mine will be drained in a few months.

A meeting will be held tomorrow at Silverton, to decide on the question of the strike among the miners of the San Juan district. The miners ask for an 8-hour day at \$3, working at present 12 hours at \$3.50. A referendum vote will decide.

In round numbers the Leadville output for the month of June is calculated at 77,000 tons.

It is the intention of Henry E. Wood to rebuild the testing works at once, probably on the same site, and in the meantime consignments of ore will be taken care of at other plants.

The Federal government has commenced suit against the Utah Fuel Company, for having fraudulently acquired coal land in Gunnison county, Colo.

The Columbia-Menona properties, together with the 30-stamp mill, near Telluride, have been transferred to the Iona Mining Company.

There is a scarcity of miners in Clear Creek and Gilpin counties, where a good deal of new work is under way.

A great deal of activity is going on in the section of Gilpin county between Rollinsville, on the Denver, Northwestern & Pacific Railway (Moffat road), and the top of Dory Hill divide, which separates that slope from the mines of Black Hawk and Central City. A branch railway is projected, and work commenced, at Pactolus, on the railroad, which, in its southern course, will tap these mines and bring their concentrated and smelting product to Denver, via the Moffat road. The ores are chiefly auriferous pyrite in a quartz matrix, and readily amenable to concentration. The plans for a 200-ton concentrating mill are already drawn, and the mill is to be erected at Pactolus. Hitherto the ores of this slope were dependent on a wagon haul of 10 miles or more to the mills or railway at Black Hawk, and the grade was too low to stand it. The name of this new line is the Gilpin & Clear Creek District Railway, and its length is to be about 17 miles.

Duluth

July 22—No one can tell what the strike of ore-dock men at the head of the lakes will amount to, nor how long it will continue. It is sufficient to state that, for a week, no ore has gone from the Duluth, Missabe & Northern docks, and that all other docks which handle ore from Minnesota mines have been closed nearly as long. For the week preceding this strike these docks shipped about 1,250,000 tons, and the Duluth, Missabe & Northern was moving ore at the rate of 525,000 tons a week. The striking laborers have tied up

all mines and railroads, and the ore ships of the lakes, and there is a daily loss now of about \$90,000 in wages on account of the demand of 750 men for 25 cents more per day, and the breaking of the agreement they made at the beginning of the season. The men now repudiate this agreement, and say that a mere verbal understanding is of no weight. The three railway companies affected are not anxious to settle on any compromise basis with men who do not regard their agreements and the docks, mines, and ships have simply ceased business.

A factor in the situation which is not generally known outside of the immediate vicinity of the mines, is the attitude of the miners. For some little time there has been talk of strike among the members of the Western Federation of Labor, which is reasonably strong on the Mesabi range, and has several flourishing lodges there. These lodges this week balloted on the question of strike or no strike, and decided to strike on July 29, if their demands were not granted by that date. It was thought that, with the men at the mines enforcedly idle on account of the trouble they would not be half so likely to make demands of their own as if everything was going on smoothly, and the cessation of operations for a few weeks might prevent or forestall any mine strikes this year. But this did not prove to be the case. Though on July 19 the Federation gave notice that a strike might be called on July 20, the morning of July 20 found its notices, calling out its men immediately, posted at all mines. The members of the Federation, therefore, went out last Saturday. As there were few men working in mines on ore, the stripping crews were taken off, and all work is suspended about the Mesabi range. While the great majority of miners are not members of this federation, they have all gone out for the present, and only the future will determine how soon the bulk of the crews will be back at work. It is, just now, the most complete tie-up that has ever taken place in the Lake Superior region. It is known that, if the dockmen win their contention now, and go back at an increased scale, they expect to make another attempt, and for still higher wages, in the course of a few weeks, so that any acceptance of their proposition now would be merely helping them to start a second fight soon, and would by no means settle the wage scale for this season.

The demands of the Western Federation are for an 8-hour day, a base of \$2.50 per day for unskilled labor, rising to \$5 for machine men, no contract labor, and, in case any contracts are made, that they be not with individuals, but with the officers of the Federation. In the meantime the Federation has raised its initiation fee from \$3 to \$5, and is furnishing sinews of war for the Moyer-Haywood fight.

On account of idleness of docks and

suspension of mining operations it has been decided that the annual meeting of the Lake Superior Mining Institute, that was to have been held July 24, shall be indefinitely postponed, and this notice has been sent out.

Scranton

July 22—Stormy scenes marked the annual convention of the first district of the United Mine Workers, which was held in Wilkes-Barre, last week, resulting in Representative Timothy D. Hayes being roundly condemned for disloyalty to the organization in the State legislature. Hayes voted against the bill increasing the number of anthracite mine inspectors and other measures fathered by the union and made some attacks upon the officers. The convention decided to reduce the initiation fee temporarily. Arrangements are also being made for a visit by President Mitchell to recruit the membership roll.

After toiling since 1827 at the shore end of a tow line the Lehigh canal mule has reached the end of his day of usefulness, and now gives way to the electric motor. In the presence of a large number of spectators a test was made at Mauch Chunk of an electric tow on the Lehigh Coal and Navigation Company's canal. A narrow-gauge track has been built on the towpath for a distance of three miles and from this a 10-ton electrical motor hauled a large canal boat. The test was most satisfactory, there being but little wash to the banks, which was the problem of fast travel. The entire canal will now be equipped in this manner.

An official statement has been made that the Delaware & Hudson Railroad will not attempt to build a new railroad into Schuylkill to tap the new coal lands it acquired within the past two years. Arrangements have been made with the Pennsylvania road for the transportation of the coal to tidewater.

W. H. Dettory, former secretary of the conciliation board, and one of the most conservative leaders of the mine workers, has entered the employ of the Lehigh Valley Coal Company as an inspector. His duty will be to inspect inside places from which complaints have been received, and thus reduce the number of grievances to be taken before the conciliation board.

M. J. Flaherty, outside superintendent at the Nottingham colliery, has been promoted to assistant superintendent of all the collieries of the Lehigh & Wilkes-Barre Coal Company, on the easterly side of the Susquehanna river, and will be succeeded at the Nottingham colliery by Joseph Becker, formerly outside superintendent at the Lance colliery. Alfred Ashton, formerly assistant superintendent at the Nottingham colliery, will succeed Mr. Becker and William Jones, breaker boss at the Nottingham, will succeed Mr. Ashton.

Two new breakers are to be built by the Lehigh Coal & Navigation Company this year. One will be located midway between Nos. 8 and 9 west of Lansford, and the other at Nesquehoning.

Operations have been resumed at the Hallstead colliery of the Delaware, Lackawanna & Western company after being abandoned for many years owing to the workings being flooded.

The Morea colliery, operated by the Dodson Coal Company is idle pending repairs to the breaker, one of the abutments supporting the structure having given way.

The Natalie colliery, Mt. Carmel, which has been idle for many years, has been acquired by Neal & Thorn, of Scranton, who will begin the repair work immediately. The same firm recently secured the Buck Run colliery near Miners Mills.

Commissioner C. P. Neill has reported that the average tidewater selling price of anthracite coal for the past month was \$4.57, thus giving the mine workers an increase of one per cent., the first since the annual reduction of 50c. in the price of coal.

Toronto, Ont.

July 19—The disturbance caused by the strike of miners at Cobalt is gradually subsiding and the situation is improving with the resumption of work by several of the mines including the Nipissing, Coniagas, Trethewey and McKinley-Darragh. The union miners have modified their terms as to wages and will accept a 9-hour shift in place of the 8 hours proposed by their schedule. This has been accepted by the City of Cobalt and McKinley-Darragh. In other cases non-union men have been taken on. Many of the strikers have left the camp. One effect of the strike will probably be the elimination of some of the wild-cat enterprises and over-capitalized concerns, on which development work has been started.

A decision was given this week in the action brought by the Florence Mining Company against the Cobalt Lake Mining Company, to set aside the grant held by the latter on the ground of a prior discovery. The trial of the main issue was recently postponed pending the decision of the Canadian Government as to disallowing the special legislation of the Ontario Legislature, confirming the title of the Cobalt Lake Company. In the meantime the Cobalt Lake Company applied to the court for an order to the effect that in case of an adverse decision it should only be liable to the extent of the net profits of the mine during the interval. The order was refused by the court which ruled that, in the event of the action being unfavorable, the Cobalt Lake Company would be held liable for the gross receipts; the company to pay costs of the application in any event.

The new Del Norte Smelting and

Refining Company, incorporated in Arizona with \$10,000,000 capital, has given out a contract for the construction of a smelter at Ville Marie on the Quebec side of Lake Timiskaming, with a daily capacity of 300 tons, to be completed within one year from date. The town of Ville Marie aids the enterprise by contributing a free site and a cash bonus of \$8000, besides exempting the company from taxes for 20 years. The old Wright lead and silver mine, which was closed last summer on account of freight and smelter charges having absorbed the profits of mining, will be the main source of supply. There are six other mines being developed in the district close to the Wright mine. It is uncertain as yet whether the company will undertake to treat Cobalt ores.

London

July 13—A company called the Deerlodge Consolidated Mines, Ltd., has been floated in London with a capital of £250,000 to acquire and work the Deerlodge, Emery, Carbonate Hill, Dewey and other claims about 30 miles from Butte, Mont. The properties are gold propositions, carrying some silver and lead. The characteristic of the lode is that there is a paystreak which can be shipped to smelters, while the remainder of the lode can be concentrated. The company is being floated by the same group of men who introduced the Esperanza mine in Spain and the Mitterberg in Austria, and Mr. Robert Addie is the mining engineer who has furnished the reports. Another American mine now being introduced to the notice of the London investing public is the Blue Bell which is situated in the Larder Lake district, of Northern Ontario. The shares offered are 1,000,000 at \$1 each in the Blue Bell gold mines, Ltd., a Canadian company, with a nominal capital of \$5,000,000. Very little is known of the property in this country. In the literature issued by the firm who are selling the shares here a great deal is made of samples of ore containing gold and silver aggregating \$42,000 per ton. If there were much of this ore, it would hardly be worth while selling stock in London. The De Lamar Company, Ltd., working in Idaho has not been able to work at a profit during the past year. The amount of ore treated was 13,897 tons averaging \$13.70 per ton. The mine revenue was £34,381, but as the total expenses were £40,702 a loss of £6333 was suffered. The chief difficulty is the excessive cost of coal and timber. Arrangements are now being made with an adjoining company, the Trade Dollar, for the supply of electric power. The latter company has a large installation of electric plant, the power being obtained from the Snake river.

The financial position and prospects of Oroville Dredging, Ltd., are now exactly determined. The company owns, as is

already well known, a number of dredging properties in California. Mr. Hammon estimates the ground to contain 14,000,000 cu.yd. of a total value of \$15,000,000, and a net profit of nearly \$10,000,000. It will take 16 years to treat this ground with the twelve dredges owned by the company. Already two years' work has been done so that the life of the property from now is 14 years. It has been decided by the shareholders that dividends shall be continued on the present basis of 2.5 per cent. per quarter until such time as a reserve of \$250,000 shall have been built up. This will happen in less than a year's time. Afterward dividends at the rate of 15 per cent. per annum will be distributed.

Two of the leading West Australian gold mining companies have issued their reports for 1906 during the past week, the Oroya-Brownhill and the Great Boulder Proprietary. The first named has made a profit of £394,996 out of which dividends at the rate of 80 per cent. per annum have been paid. The amount of ore treated was 128,180 tons and the gold yield was 148,203 oz. valued at £630,318. Development has recently disclosed very large quantities of lower-grade ore in addition to continued discoveries of ore equal in quality to that mined last year. The Great Boulder Proprietary made a profit of £329,495 during 1906 and £262,500 has been distributed as dividends. The ore treated amounted to 149,943 tons which in the sulphide mill yielded 146,317 oz. Battery tailings also yielded 4346 oz. bringing the total to 150,712 oz. valued at £554,797. The ore reserves blocked out amount to 3½ years supply averaging \$18 a ton, and developments continue to open up large bodies of profitable ore.

The report of the Tyee Copper Company, Ltd., Vancouver Island, for the year ended April 30 shows that the prospecting and development at the mines has not yet disclosed any new orebodies. The directors and manager are still hopeful, however, that discoveries may be made. Though the orebodies are being depleted it is a matter of congratulation that the customs work at the smelter is increasing in a satisfactory way, so much so that increased plant is in contemplation.

Some time ago, when writing of the bonanza discovery at the Esperanza mine near El Oro, Mexico, I mentioned that the discovery had had a cheering effect on the shareholders of adjoining mines through which the same or similar veins passed. This optimism has already been justified in the case of the Oro Mining and Railway Company. According to reports on the development of the San Rafael vein on this property it appears that at the 1000-ft. level this vein changes from oxidized to sulphide ore and the gold contents of the sulphide ore vary from \$50 to \$100 per ton, as compared with the average of \$10 to \$15 in the oxidized ores above. The level is being very fully developed and explored.

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

Arizona

GRAHAM COUNTY

Arizona Copper Company, Ltd.—The report of the half year ending March 31, shows profits of \$1,346,597 which includes \$55,238 brought forward from the previous half year. The dividend for the half year on the A preferred stock and on the 7 per cent. preferred stock amounted to \$58,877. Out of the balance the directors have decided to pay 2s. 3d. on the preferred ordinary and deferred ordinary shares, the same as for the corresponding period of last year.

YAVAPAI COUNTY

DeKalb Mining Company—This company has made an important strike in its mines near Crown King. At a depth of only 30 ft. a lead of lead-silver ore has been uncovered, the width of which has not yet been determined, but the whole bottom of the shaft is in ore which assays in silver and lead. Development work is being rapidly pushed.

Jerome Mines Development Company—This company, on July 1, made the last payment upon the Harryhausen group of mines, situated near Jerome. For more than six months the company has been prospecting with a diamond drill. These mines adjoin the United Verde on the north.

Verde Grande Copper Company—This company, operating near Jerome, is installing a steam hoist, and preparing to prospect its ground to greater depth.

California

ALPINE COUNTY

Hercules—The strike of shipping ore found on the 800 level of this old mine proves to be on the apex of a widening ledge. The mill cannot be started up until the dam is repaired.

Morning Star—McLarley & Ely, of Tonopah, have a bond on this property at the head of Mogul cañon. The old tunnel run by the English company is being cleared out, and the shaft has been drained by pumps. No ore shipments have been made for many years.

BUTTE COUNTY

Butte Star—Pennsylvania men have bought this mine on the Magalia ridge. Considerable capital is now being invested in that locality.

Mammoth Channel Gold Mining Company—This company, which recently

bought the Mammoth and Magalia Channel ground, near Magalia, is about to sink a three-compartment shaft.

CALAVERAS COUNTY

American Mineral Milling Company—This company of Fruitvale, Alameda county, has purchased the old Chalk mine between Comanche and Wallace.

INYO COUNTY

Crackerjack Gold Company—This company has its tunnel in 325 ft., and its shaft down 100 ft.

Death Valley and Arcalada Company—From these mines two to three carloads of ore will be shipped weekly, from Greenwater.

Death Valley Mining Company—This company has shipped from Greenwater two more carloads of high-grade ore.

KERN COUNTY

Winnie & Johnnie—J. W. Barter and Val Schmidt, of Los Angeles, have purchased this tungsten mine, three miles west of Randsburg, for \$30,000, and are now sinking two shafts on narrow veins. Several new discoveries of tungsten in that region have been made lately.

MADERA COUNTY

Hildreth—Tonopah, Nevada, men are inspecting the Ryan claims at this old camp, with a view to purchase.

MODOC COUNTY

Discovery—On this claim, near Fort Bidwell, two shifts of miners are now at work drifting on the ledge found last winter.

NEVADA COUNTY

Marcotte—While grading for a new stamp mill Fred Marcotte struck a wide ledge near his group, the quartz panning plenty of colors.

Norambagua—Plans have been completed for new and heavy machinery for this mine, at Grass Valley. Work is to be pushed at once on the lower tunnel.

North Star Mining Company—This Grass Valley company has declared a dividend of 20c. a share, aggregating \$50,000.

PLACER COUNTY

Prairie Flower—Lizano & Hurst have leased this old mine, at Canada Hill. The mine was formerly the Pain.

Secret House—Fred Snyder has found a quartz ledge in Black cañon, adjoining the Alameda Quartz mine.

PLUMAS COUNTY

Boston Emma Mines Company—This company has just put up a 5-stamp mill, which is to be enlarged to 15 stamps during the summer.

Gold Stripe—This mine, near Greenville, is being examined with a view to purchase. It is being worked by Maurice Benedict and Alex. Thompson.

Plumas Mohawk Gold Mining Company—This company, at Johnsville, is preparing to install Huntington mills of 400 tons daily capacity, and is putting about \$200,000 on its new equipment.

SAN BERNARDINO COUNTY

Twenty-nine Palms—In this desert district there are now ten mines in operation. The Gold Park Company is employing 18 men and adding power drills to its equipment. Among other properties being developed are the Queen, Hexie, Lost Horse, El Dorado and Porcupine. The Taylor-Sullivan Company is opening several groups.

SHASTA COUNTY

Gold Leaf and White Oak—Both these mines, H. O. Cummins, superintendent, are preparing to ship large quantities of silicious ores to the Mountain copper smelters.

Yankee John—Phenomenally rich ore continues to come from this mine, where the rich discovery was made a few weeks ago.

SIERRA COUNTY

Black Jack—This claim in Jim Crow cañon is being reopened after an idleness of 27 years.

Empire—This mine at Gold Valley, near Downieville, has started operations after six months' shut down. The 20-stamp mill has been remodeled.

Neversweat—This property, near Alleghany, has been bonded by L. P. Woodbury and associates of Chicago, Ill., and an old tunnel is being reopened and repaired.

SISKIYOU COUNTY

Oregon Mining and Water Power Company—This company, D. I. Jackson, manager, has sent a Keystone drilling plant to its mine, four miles below Happy camp. The gravel is to be prospected.

Nordheimer—This old hydraulic mine, on the Salmon river, 24 miles from Orleans, has been sold by William Lord, to

Palo Alto and Los Angeles men. The same people have also bought the Markusen hydraulic mine, near Orleans.

Keating—The Thomas Keating group, 12 miles south of Callahan, has been bonded by A. L. Bellevs and associates. A mill is to be erected.

TRINITY COUNTY

Salmon Summit Mining Company—This new company is to open a group of claims on Salmon summit. Arcata, Humboldt county, men are the promoters.

TUOLUMNE COUNTY

Mountain Lily—The main tunnel is in 1700 ft., and is being run ahead for the specimen shoot.

McAlpine—This Mother Lode mine is being pumped out by Whitcomb & Jorey, of San Francisco.

Spring Gulch Mining Company—Work on the 100-stamp mill of the Grizzly, Dead Horse and New Albany mines, now consolidated, is progressing rapidly.

Colorado

LAS ANIMAS COUNTY

Segundo—It is reported that the Colorado Fuel and Iron Company has succeeded in purchasing the strip of ground between its coal lands and the railroad tracks, which will make it possible to get out coal economically through a new opening.

LAKE COUNTY—LEADVILLE

Bartlett Tunnel—Two carloads of ore are being shipped daily from the tunnel on Sugar Loaf. While some of the ore is dump material, a much better quality is coming from the vein.

Gold Ore—Several samples of ore running high in gold were recently brought into a local assay office from a gulch near Homestake. The vein is said to be a foot wide and is a fissure between porphyry and granite.

Hibschle Shaft—About two carloads of lead ore are being shipped daily from the Hibschle property, and as soon as the railroad switch is completed the lessees will ship 100 tons per day.

Matchless—Several sets of lessees are at work on this property on Fryer Hill. A new shaft has been started.

Silicious Ores—A great demand for silicious ores has recently arisen among the smelters and a considerable tonnage is being shipped from this district, principally from Fryer Hill. The ore is very low grade.

Yak Tunnel—The tunnel has settled down to steady growth and expansion. The Yak is at present shipping about 200 tons of various kinds of sulphide ores.

Indiana

WARRICK COUNTY

Caledonia Coal Mining Company—The company pleaded guilty to violating the State mining law upon charges preferred by State Mine Inspector Epperson, in seven counts, and fines were assessed in the sum of \$69.75. The violations consisted of a failure to make a monthly report to the inspector.

GREENE COUNTY

New Summit—About 300 miners working in the mine, went on a strike because the company refused to discharge the superintendent. The strike was unauthorized by the district union, and under the agreement the miners will be fined \$1 per day for the eight days they were idle, or an aggregate of \$2400.

Michigan

HOUGHTON COUNTY—COPPER

Calumet & Hecla—Work on the foundations for the new re-grinding mill and boiler house is progressing rapidly and one of the 200-ft. self-supporting steel stacks is nearly complete. At the electric power plant the third 2000-kw. generating unit is being assembled. At the mine the company is erecting a large brick pattern shop, an adjunct to the new foundry, which is to be put into commission this week.

KEWEEANAW COUNTY—COPPER

Gratiot—Sinking is going on in the two shafts of this property with all possible speed. No. 1 shaft is down nearly 200 ft., and when this depth is reached a plat will be cut and a level started. No. 2 shaft, which is just north of the Mohawk, is down approximately 350 ft.; at a depth of 220 ft. a level was started and drifting is continuing north and south. Both shafts are being sunk on the vein; and very good rock is being accumulated on the stockpile.

Cliff—The spur on the Keweenaw Central to this property is about complete, and as soon as this is finished a shipment of rock will be made to the Tamarack mills, and a test run put through.

Keweenaw Copper Company—Mandan shaft is bottomed in a very encouraging formation at a depth of 750 ft. The company has let a contract for a number of dwellings which will be ready for occupancy in a month or so, and as soon as ready the force working at this property will be increased.

ONTONAGON COUNTY—COPPER

Lake—The site for a new shaft is being rapidly cleared away, and sinking will be started as soon as possible. Much interest will be taken in the property, as a number of drill cores taken showed that the Baltic lode traverses its land. The cores were well mineralized, but the sink-

ing of this shaft will be necessary to show the true character of the formation.

Missouri

ZINC-LEAD DISTRICT

Badger-Peacock—On May 13 a heavy rain causing a flood in Spring river completely inundated the camp and curtailed the output at least 300 tons per week. Since that date nine pumps have been steadily at work lowering the water at the rate of 10,000 gal. per min. 1½ ft. per day. It is expected that the mines will be producing again next week. A dyke has been built along the river bank which, it is believed, will combat any future rise in the river.

New Sheet Ground—The many drill strikes immediately south of, and in the city of Webb City have set mining men to wondering if it will not eclipse the wonderful sheet ground section north of that city. Col. James O'Neill has proved the sheet ground formation on the old Sucker Flat, and now A. D. Hatten and others have made rich strikes at a depth of 200 ft. still south on the Troup land. The sheet of ore is 10 ft. thick and runs 7 to 10 per cent. in ore, which is considerable better than the mines north of Webb City.

Mercantile, No. 1—Two months ago the Mercantile mill No. 1 operating on a sublease on the Guinn land north of Webb City, was consumed by fire. The company has placed a contract for a steel frame mill and work has been begun. The framework will be entirely of steel inclosed with corrugated sheeting. The only wood about the mill will be the jigs, which are always wet. The cost of the mill will be 25 to 30 per cent. more, \$22,000 against \$17,000 for a frame mill, but there will be no insurance expense. This will be the first steel frame mill in the district.

Missouri Lead and Zinc Company—The new concrete power house of the company is about completed and the new 900-h.p. Westinghouse generator has been installed with its 30-ton fly-wheel and a Porter & Allen engine. The 8-in. pump which draws the water from the 1370-ft. well on the land has also been installed. When completed the company will have 1700 h.p. and will supply power for all purposes on the lands.

Power Shovels—While one company is preparing to settle the shoveler question in the sheet ground mines at Webb City by installing a steam shovel, another in the Duenweg district is going to introduce a shovel operated by compressed air.

Montana

BUTTE DISTRICT

Anaconda—The shaft on the High Ore is 2855 ft. deep and will be sunk 20 ft. more. A large station will be cut at the

2800-ft. level and about a year will elapse before the veins are tapped from the station. The company is using the electric haulage system on the 2200- and 1600-ft. levels and is preparing to install one at the 2000.

Boston & Montana—The company is mining and shipping to its plant all the ore that can be treated by present facilities, the quantity aggregating 3350 tons a day. It is running short of coal, as are also some of the other Amalgamated companies. The shaft on the Greenleaf is 865 ft. deep and will be stopped temporarily at the 1000, where the vein cut at 840 ft. will be crosscut. This vein is about 11 ft. wide, and although not solid commercial ore, it contains stringers from 5 to 10 in. wide that will average well in copper. Its course is northwest by southeast, and dips south.

Coalition—This company has made a strike of copper ore 40 ft. south of the shaft at the 2200-ft. mark of the Corra mine. The vein is 46 ft. wide and is principally first class. The company has finished crosscutting it and is beginning to drift in both directions from the point of intersection. This body of ore apexes below the 1900-ft. mark and is of a better grade than any other ever discovered in the property. The company is now going after it at the 2000 and will soon resume sinking in order to get it below. The ore production of Coalition is only about 1200 tons per day at present, the result of a suspension of mining in the Minnie Healey on account of gas from fire in the upper levels. Preparations for a resumption of ore extraction in the lower levels of this mine are in progress, but the output will be hoisted through the shaft of the Leonard.

North Butte—The daily production of this company remains about 1250 tons a day. Development of the Edith May vein at the 1800 is progressing. The face of the crosscut north of the Jessie at the 1600 has not encountered the Berlin vein, but is advancing rapidly. No attempt to open the Berlin from the surface will be made until the suit between Harry Gassert and Morgan Strong over a portion of the proceeds of the sale of the Berlin group to the North Butte Company is decided.

Nevada

ESMERALDA COUNTY—GOLDFIELD

Atlanta—The Boom shaft is down to the 380-ft. level. The lessees on the Cherokee claim have cut the vein at the 200-ft. level, and assay returns are satisfactory. The shaft has been sunk to the 300-ft. level, and a crosscut will be started to cut the vein at that depth. The Florence Hopkins shaft is down to the 380-ft. level. It is proposed to start four crosscuts immediately with the view of picking up the Little Florence vein.

Little Florence—A new 60-h.p. hoist has been installed, and is hoisting about 70 tons of ore daily. This output will be increased to 120 tons within the next fortnight. Good ore has been developed in several parts of the workings between the 250-ft. and 300-ft. levels where the vein averages 2½ ft. in width. The main shaft is being sunk at the rate of 6 ft. per day, and has now passed the 325-ft. mark. It is proposed to cut the vein at a point 100 ft. below where it was opened in the Mohawk Florence ground by means of a crosscut from the 370-ft. level.

Mohawk—The recent find in the south drift on the 450-ft. level has developed into the largest and richest orebody on the field. The general trend of the vein appears to indicate that it is a continuation of the rich veins developed in the Gold Wedge claim on the Jumbo Extension.

Mohawk Jumbo—The vein in the south drift on the 450-ft. level is 5 ft. in width, and is of shipping grade. The preliminary assay returns are high. The ore being shipped from the old workings averages 70 tons per day, valued at \$120 per ton.

Simmerone—The west crosscut on the 250-ft. level is out 130 ft. from the shaft. The eastern crosscut on the same level is out 100 ft. Some fine looking quartz has been cut, and it is proposed to follow up the vein by drifting. The crosscut will also be continued.

Velvet—The lessees of the Algie claim have sent the shaft down past the 260 level. Several low-grade veins have been cut. It is intended to continue sinking to the 300-ft. level before drifting and crosscutting.

NYE COUNTY—BULLFROG

Belle—The shaft has reached a depth of 250 ft. and at this point there has been a considerable improvement in the size and prospects of the vein. It is proposed to continue sinking to the 300-ft. level before drifting.

Denver Annex—The tunnel on the Louisville ledge is in 100 ft., and has cut the vein which is 3 ft. in width and carries good values.

Golden Scepter—The Hobo ledge has been cut in a crosscut east from the 100-ft. incline. It is 4 ft. in width and averages \$20 per ton in value.

Original Bullfrog—The new shaft has been sunk to a depth of 30 ft. It is proposed to continue sinking to the 100-ft. level before drifting on the vein.

Tramp Consolidated—A large force of men continues to be employed and vigorous prospecting and development work is being done. The Eclipse drift has been run 600 ft. south from the crosscut tunnel, and the vein carries good values for the greater portion of the drift. The Tramp tunnel is duplicating this drift at an increased depth of 113 ft. The winze be-

low the fourth level in the Denver claim is down 160 ft. It will be continued to the 200-ft. point before a crosscut is started.

NYE COUNTY—MANHATTAN

Dexter—A shipment of 28 tons of ore from Leases Nos. 1 and 2 recently sent to Salt Lake returned \$300 per ton. It is probable that further shipments will be made shortly.

Federal—Development operations have been started on this property, situated in the Willow Springs section of the field. Surface prospecting resulted in the discovery of a promising ledge, and the company determined to sink a shaft to the 200-ft. level to develop it. A power hoist has been ordered.

Mustang—The output of ore is averaging 3 carloads per day. It is chiefly high grade, and is sacked as soon as broken down. The workings continue to develop well, and large ore reserves have been opened up.

NYE COUNTY—MANHATTAN

Thanksgiving—The main shaft has cut a 3-ft. vein at a depth of 250 ft. The ore assays well and appears to carry tellurium. In some respects samples of the vein resemble the telluride ore of Cripple Creek.

Mustang Extension—The new shaft has been sunk to a depth of 70 ft., and will be continued to the 200-ft. level as rapidly as possible with the view of developing the orebodies opened up by the old shaft.

Otero—The shaft has been sunk to 120 ft., and has been re-timbered from top to bottom. A powerful hoist has been installed and sinking will be continued working three shifts. The workings are looking well and ore of good milling grade is showing in several places.

NYE COUNTY—TONOPAH

Ore Shipments—Shipments over the Tonopah Railroad for the week ending July 11 were: Tonopah Company, 950 tons; Montana-Tonopah, 115; Belmont, 275; Jim Butler, 90; sundry small mines, 25; total from Tonopah, 1455 tons. Gold-field shipments were 1610 tons, making a total of 3065 tons. In addition the Tonopah company sent 2630 and the Belmont 1010 tons to the mills.

Pennsylvania

ANTHRACITE COAL

Coal near Heckscherville—The Minersville Water Company, in constructing a storage dam near Heckscherville, recently uncovered a thick bed of coal. The coal is believed to be the Lykens Valley seam.

Colonial Collieries Company—This new corporation has acquired the property of the Anthracite Coal Company, formerly the Natalie Coal Company, and has begun development work. The property consists

of 2754 acres of anthracite coal land in Northumberland and Columbia counties. The new company includes the firm of Madeira, Hill & Co., of Philadelphia. The officers are: P. C. Madeira, president; James N. Neele, vice-president; and L. C. Madeira, secretary and treasurer.

South Dakota

LAWRENCE COUNTY

American Eagle—A 14-ft. body of ore was encountered while excavating for a mill site. A large amount of ore has been opened up in the flat formation from which former shipments to the Hildebrand mill netted \$6 per ton.

Esmeralda—Emil Faust, who owns this property in Blacktail gulch, will start up his mill this month. Improvements are being made for the saving of slimes.

Hidden Fortune—H. J. Mayham, the original promoter of the Hidden Fortune and Columbus companies, reports the consolidation of the two and that the work is to be started at the mine and mill within 30 days.

Homestake—This week the Homestake mill with 200 stamps was started, which gives full capacity, 1000 stamps in operation. The water in the mine has been lowered below the 600-ft. level. Little damage on account of the flooding of the mine has resulted in the lower workings. The company has installed the air lift system in the Ellison shaft throwing water from the 1100- to the 300-ft. level, where it is discharged through the Savage tunnel. There are two 8-in. pipes with a 2-in. air pipe in the center and a 6-in. pipe with a 1-in. air pipe in the center. A head of 800 to 1000 lb. of air is used. The inflow of the mine is estimated at 1000 gal. per minute.

Utah

BOX ELDER COUNTY

Lakeside Copper Company—It has been demonstrated that the ore deposits of this property lie in blanket form and that they can be successfully treated by leaching.

Salt Lake Copper Company—This corporation is shipping ore regularly to the Salt Lake smelters from its property near Lucin.

JUAB COUNTY

Tintic Shipments—Carloads of ore sent to the Salt Lake smelters for the week ending July 20 were: Ajax, 1; Beck Tunnel, 9; Bullion Beck, 5; Centennial Eureka, 34; Colorado, 6; Carisa, 8; Eagle & Blue Bell, 4; Grand Central, 3; Lower Mammoth, 5; La Clede, 1; May Day, 1; Mammoth, 5; Ridge & Valley, 3; Star Consolidated, 1; Scranton, 7; Tintic Iron, 6; Uncle Sam, 5; Yankee Consolidated, 4.

May Day—Additional equipment is being installed in the mill belonging to this company.

SALT LAKE COUNTY

South Columbus—Regular shipments from this mine at Alta have been inaugurated. The ore carries silver, lead and some copper.

SUMMIT COUNTY

Iowa Copper Company—Ore shipments have been inaugurated from this property at Park City.

New York Bonanza—Preparations are being made for the resumption of work at this mine after a shut-down of several weeks.

Ore Shipments—Shipments from Park City mines for the week ending July 20 aggregated 3,069,505 lb. the mines and amounts being: Silver King, 654,505; Daly West, 900,000; Daly Judge, 1,061,000; Little Bell, 280,000; Daly, 90,000; Copper Apex, 40,000; Iowa Copper and others, 44,000 pounds.

Washington

LEWIS COUNTY

Crescent Coal Company—The mine and coal lands of this company have been purchased of Beall Foster and business associates of Tacoma. About 200 acres of land about four miles west of Chehalis are involved.

Canada

BRITISH COLUMBIA—EAST KOOTENAY DISTRICT

Sullivan Group Mining Company—The published report of ore production for the month of May at this company's mine, situated near Kimberley, East Kootenay, is as follows: On hand April 30, 3370 tons; mined in May, 2210 tons; total, 5580 tons. Shipped to company's smelter at Marysville, East Kootenay, 2259 tons; on hand May 31, 3321 tons. At the smelter 2478 tons were smelted during the month; bullion shipped, 402 tons, valued at \$46,482. Smelter production for nine months ended May 31: Lead, 6,040, 489 lb.; silver, 140,000 ounces.

ONTARIO—COBALT DISTRICT

Ore Shipments—Shipments of ore from Cobalt camp for the week ending July 13 were: Buffalo, 60,000 lb.; Coniagas, 319,200; Foster, 52,000; McKinley-Darragh, 80,000; total 511,200 pounds.

Right of Way—A dividend of 7 per cent. has been declared, being the second at this rate within three months. All mining so far has been by hand but a compressor is now in and the company expects to get out two carloads per week.

McKinley-Darragh—Open-cut work is being prosecuted on the new No. 7 vein, near the southern boundary of the Nipissing property. It is rich in native silver and more than 15 tons of ore have already been taken out. A shaft will be sunk on this vein which will be the fourth on the

property. The new centrifugal pump on the cofferdam has been completed and pumping has begun.

Africa

TRANSVAAL

Gold production in June is reported at 507,559 oz. fine; a decrease of 16,918 oz. from May, but an increase of 48,502 oz. over June, 1907. For the half-year ended June 30 the total was 2,656,449 oz. fine gold in 1906, and 3,138,732 oz., or \$64,877,590, in 1907; an increase of 482,283 oz., this year.

The Witwatersrand Native Labor Association reports that during June 6132 natives were distributed to the mines, and 8014 left through expiry of contracts and other causes, and there was consequently a net loss on the month of 1882. At the end of the month there was a total of 89,787 natives employed on the mines. A telegram from Johannesburg, dated July 9, states that of the 53,409 Chinese coolies who were in the Transvaal on May 30, 70 died in June, and 1842 were discharged for repatriation, leaving the total number in the country 51,497 at the end of June.

WEST AFRICA

Gold production in June is reported at 24,250 oz. bullion, being 604 oz. less than in May. For the half-year ended June 30, the total was 104,171 oz. in 1906, and 144,484 oz. in 1907; an increase of 40,313 oz. The bullion reported this year was equal to 135,623 oz. fine gold, or \$2,803,322 in value.

Asia

INDIA—MYSORE

Kolar Goldfield—The reported gold output in June was 44,741 oz. bullion, being 340 oz. less than in May, and 3075 oz. less than in June, 1906. For the half-year ended June 30 the total was 292,956 oz. bullion in 1906, and 268,211 oz. in 1907; a decrease of 24,745 oz. The bullion reported this year was equal to 241,390 oz. fine gold, or \$4,989,531 in value.

JAPAN

A brief cable from Tokyo reports a great disaster resulting from an explosion in a coal mine at Toyuka, in Bungo province, on July 20. The cause of the explosion is not given; presumably it was gas. There were 470 men at work in the mine, and practically all of them were killed.

Australia

QUEENSLAND

The Mines Department reports the production of gold in June at 34,509 oz. fine, or \$713,301 in value.

VICTORIA

The gold production for the half-year ended June 30, is reported at 366,317 oz. fine, or \$2,571,772 in value.

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

There is considerable activity along the Atlantic seaboard, due principally to the shipments of coal to the far East. The continued lack of water transportation facilities, together with a desire on the part of the consumers to lay in, at this early date, their winter supply, is responsible for this condition. With summer conditions prevailing on the railroads it is believed that enough coal will come forward to keep the trade along the Atlantic seaboard well supplied; but there are some in the trade who are talking of a large shortage and higher prices in the fall.

In the Alabama field considerable development is going on, and the demand continues strong, and prices are holding firm. Little or no stocking is going on which argues for the continuance of a strong demand in this field.

The production in the Pennsylvania field shows an increase, and prices hold firm, except for slack, which has been offered as low as 25c. per ton in some quarters.

The middle West is quiet, but prices show no tendency to drop. However, the only real demand is among the harvester trade, and here the demand is active. But this is the only class of trade that is calling for much coal.

COAL-TRAFFIC NOTES

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to July 13, were as follows, in short tons:

	1906.	1907.	Changes.
Anthracite.....	2,235,583	2,995,280	I. 759,697
Bituminous.....	16,566,519	20,066,018	I. 3,499,499
Coke.....	6,747,547	7,483,150	I. 735,603
Total.....	25,549,649	30,544,448	I. 4,994,799

The total increase this year was 19.5 per cent.

New York

ANTHRACITE

July 24—The anthracite market is dull, although there seems to be more activity than during the same period of other years. The dullness is felt more in egg size than in broken, stove or chestnut; small sizes are a little more active and demand for this season is fair. We quote prices as follows: Broken, \$4.55; egg, stove and chestnut, \$4.80; pea, \$3; buckwheat, \$2.50; rice and buckwheat No. 2, \$1.90@2; barley, \$1.50@1.60; all f.o.b. New York harbor.

BITUMINOUS

The Atlantic Seaboard soft-coal trade is looking better than it has for some weeks. There seems to be a shortage of coal for this season of the year, and most shippers have full order-books. Water transportation is showing a slight improvement, with a better supply of vessels, although the rates continue at the high figures which have prevailed so far this summer.

Trade in the far East is calling for considerable coal and consumers seem to be anxious to accumulate their winter supply, a condition which anticipates the usual winter stocking by a month or six weeks. A few weeks ago there was a hesitancy shown in paying the prevailing high freight rates, but at present, instructions are coming forward removing the limits on charters in order to get the coal forward promptly. Trade along the Sound is not as active as farther east, but it is perceptibly better than a few weeks ago, and what was expected at this time; it is much better than at this time last year.

New York harbor trade shows a plentiful supply of coal on hand, although demand about takes care of this supply. Conditions prevailing are better than at this time last year. Good grades of steam coal bring about \$2.60 in this market. All-rail trade is slow, and the stocks that were put in early in the season by this trade seem to be holding out satisfactorily. Transportation from mines to tide is about up to schedule, and car supply is up to all demands.

In the coastwise market, vessels are in slightly better supply, but freights show no tendency to be weak. We quote current rates of freight from Philadelphia to Boston, Salem and Portland, \$1.10; to Lynn, Newburyport, Bath, Gardiner and Bangor, \$1.25; to Portsmouth, \$1.15; to the Sound, 90c.; with towages where usual.

Birmingham

July 22—Development in the Alabama coal fields continues active. The Red Feather Coal Company, operating mines at Lucile, in Bibb county, during the past week signed the wage scale with the union miners and at the same time announced that employment would be given to more men. The company has let a contract for the erection of a number of houses for the miners. With but two exceptions the miners' union has succeeded in renewing contracts with all commercial

coal operators who signed the scale a year ago.

There is still a demand for every ton of coal that can be mined in this State, and prices are holding firm. Very little coal has been stocked so far in this section of the country for winter use. Judging from the development well in hand, the extra demand for coal in the winter will be met. No less than six new mines, with an average daily output of seven hundred tons, and more, will be in operation by the fall.

The mining laws introduced in the legislature in the early part of the session are still on the calendar, and are opposed strongly by the operators.

The Tennessee Coal, Iron and Railroad Company has started on a contract of 30,000 tons of coke, for Monterey, Mexico. Delivery will be made at the rate of 5000 tons a month, and the shipments will be mostly by rail. It is understood that the coke was sold above \$4 per ton at the ovens. The company has also received orders recently from the Atlantic Coast Line and Central of Georgia railroads, which will warrant active operation of the coal mines through the summer, those lines stocking coal for winter use.

Cleveland

July 23—The coal market continues dull and easy. Anthracite is in large supply and dealers have an overplus, after filling contracts. Some sacrificing is reported. On account of the trouble up lake, some vessels have come down light to load coal, and a large tonnage is being moved up this month.

Coke rules dull and easy with furnace grade selling last half delivery at \$2.25@2.50 and foundry at \$3@3.50 per ton.

Chicago

July 22—The wholesale coal market is quiet, but prices in general are firm, with no prospect of a slump and with demurrage evils not so great as in former summers. Except for the harvesting business, there is no activity in the sales of bituminous coals, and anthracite sales are only slightly increasing as the consequence of the closing of July and the ending of the discount for the month.

Illinois and Indiana bituminous bring about the same prices as last week—\$1.75 @2.65 for lump and egg; \$1.65@2 for most of the run-of-mine sold; and \$1.25@1.65 for screenings, the average being perhaps 10c. lower. Fine coals are being

sold largely, but the supply is so great that prices tend to drop rather than to rise. Shipments are fairly regular, however, and there seems no danger of a sudden increase, the situation being well understood by Western operators.

Eastern coals are not only quiet but the amount sold is small of nearly all kinds. Hocking Valley brings \$3.15; smokeless \$3.24 (run-of-mine); Pittsburg No. 8 is in even supply and demand at \$2.90 for 1¼-in. and Youghiogheny brings \$3.30 for ¾-inch.

Indianapolis

July 22—The demand for Indiana coal has been unusually good. While the demand for domestic coal fell off lake shipments and the high stage of water in the Ohio river, together with storing of coal by the railroads, kept the mines in full operation, rather an unusual thing at this season of the year.

After a stormy session of the executive committees of the operators and mine-workers at Terre Haute, July 16, the vexed top-coal question was practically settled. The matter has been put in the hands of a joint committee, and it is unlikely that further misunderstanding will arise in this matter. According to the plan adopted any top-coal difficulties will be referred to a special committee made up jointly of miners' and operators' representatives who will decide whether, in their opinion, it is necessary to knock down the coal in question. The finding of the joint committee will be final. This question recently came to a crisis at the Rosebud mine, where miners shot down top coal, and were discharged by the operators. The discharged miners, according to the agreement, will be taken back to work without prejudice and without pay for the days they lost.

The committee of miners from districts 8 and 11 that called on Governor Hanly, for the purpose of securing a suspension of the law relating to the size of bit allowed in drilling holes in the coal for blasting out quantities of coal, were advised by the governor that he had no power to suspend the operation of any law. He urged them to study all the phases of the law, secure all the facts and bring their grievances and recommendations to the next legislature—which body alone had the power to repeal or amend a law. Present at the conference was State Mine Inspector Epperson and denied that the law had decreased the output of the mines or the wages of the miners.

Pittsburg

July 23—Production in the past week was greater than in a like period for several years. There are plenty of railroad cars, and most of the mines in the district are being operated to capacity. The fire at the Hazel mine was put out after three days' hard work, and the loss will not exceed \$4000. The mine is in suc-

cessful operation, and today all records of production in the district were broken at Hazel when 135 railroad cars were loaded. A number of new electric locomotives are being installed at the mine, and the output will be greatly increased. A sudden storm along the Monongahela river last week caused a flood, and did considerable damage to coal loaded and to the tipples along the stream. Barges were swept away and sunk. It is estimated that the loss will amount to over \$500,000. The rivers continue navigable, and coal is being sent to lower ports as it is mined. Prices remain firm on the basis of \$1.20 for mine-run coal at the mine. Slack, however, has declined, and some operators are offering it as low as 25c. a ton. The large producers will not sell at less than 70c. and are storing it until the demand improves.

Connellsville Coke—There is no free coke in the Connellsville region for delivery this year, but there is some in the hands of dealers that is being held at good prices. Standard Connellsville furnace coke is quoted at \$2.50@2.75, and from the lower region at \$2.35@2.50. Foundry coke is firm at \$3@3.25 for any delivery. The *Courier*, in its summary for the week, gives the production in both fields at 395,998 tons. The shipments aggregated 13,450 cars, distributed as follows: To Pittsburg, 4891 cars; to points west of Connellsville, 7764 cars; to points east of Connellsville, 995 cars.

Foreign Coal Trade

Shipments of Nova Scotia coal for the six months ending June 30 are reported by companies as follows:

	1906.	1907.	Changes.
Dominion.....	1,430,396	1,386,306	D. 44,090
N. S. Steel.....	264,913	240,686	D. 24,228
Cumberland.....	223,474	176,527	D. 46,947
Acadia.....	125,320	142,594	I. 17,274
Inverness.....	72,658	103,037	I. 30,379
Intercolonial.....	139,543	131,897	D. 7,646
Total.....	2,256,304	2,181,346	D. 74,958

This shows a total decrease this year of 3.3 per cent.

Imports of coal into Germany for the five months ending May 31 were, in metric tons:

	1906.	1907.	Changes.
Coal.....	3,362,341	4,485,481	I. 1,123,140
Brown coal.....	3,547,574	3,541,673	D. 5,901
Total.....	6,909,915	8,027,154	I. 1,117,239

Imports of coke for the five months in 1907 were 184,164 tons; of briquets, 65,845 tons; of peat fuel, 4535 tons.

Exports of coal from Germany for the five months ended May 31 were as follows, in metric tons:

	1906.	1907.	Changes.
Coal.....	8,192,139	7,949,197	D. 242,942
Brown coal.....	7,938	7,597	D. 341
Total.....	8,200,077	7,956,794	D. 243,283

Exports of coke for the five months in 1907 were 1,504,478 tons; of briquets, 484,997 tons; of peat fuel 8689 tons. The

coke exports included 5710 tons to the United States.

The coal production of the German Empire for the five months ended May 31 was, in metric tons:

	1906.	1907.	Changes.
Coal.....	56,916,584	57,997,642	I. 1,081,058
Brown coal.....	22,583,892	24,666,854	I. 2,082,962
Total mined..	79,500,476	82,664,496	I. 3,164,020
Coke made.....	8,141,713	8,824,207	I. 683,494
Briquets made,	5,814,723	6,385,634	I. 570,911

A large proportion of the briquets is made from brown coal, or lignite.

Exports of fuel from Great Britain, with coal sent abroad for the use of steamships engaged in foreign trade, are reported as follows for the half-year ended June 30, in long tons:

	1906.	1907.	Changes.
Coal.....	26,548,462	29,675,774	I. 3,127,312
Coke.....	339,918	416,737	I. 76,819
Briquets.....	699,520	709,702	I. 10,182
Total exports..	27,587,900	30,802,213	I. 3,214,313
Steamer coal.....	8,999,522	9,102,823	I. 103,301
Total.....	36,587,422	39,905,036	I. 3,317,614

The exports to the United States, included above, were as follows:

	1906.	1907.	Changes.
To Atlantic ports.....	20,563	10,417	D. 10,146
To Pacific ports.....	23,425	19,681	D. 3,744
Total.....	43,988	30,098	D. 13,890

The larger exports this year were to France, 5,289,833 tons; to Germany, 4,168,788; to Italy, 4,106,120; to Sweden, 1,535,775 tons.

Iron Trade Review

New York, July 24—Interest this week in the iron and steel markets is centered in the trouble in the Lake Superior ore region. A strike of the dock laborers at Duluth and Two Harbors has extended and this week the Western Federation of Miners ordered out all the miners. That the situation is regarded as serious was indicated by the prompt action taken by the United States Steel Corporation. A meeting was held at headquarters in New York July 23 which was participated in by representatives of the leading ore interests. It is reported here that it was decided to oppose the demands of the workers for an advance in wages and fill their places. This will be a difficult task as there are fully 30,000 men employed in the region and a majority of them are expected to join in the movement for an increase in pay. While the result will not have any immediate effect on pig iron production the loss in ore will be felt later on. If the strike becomes general the loss in ore will amount to about 200,000 tons a day, according to one of the officials of a steel concern. Most of the furnaces are well provided with ore for several months, particularly the furnaces of the United States Steel Corporation. No one is worrying about the situation for the present. One of the good results of the trouble was in stiffening a declining pig-iron market.

It is reported that the United States Steel Products Export Company has secured the contract for 12,000 tons standard steel rails for the Japanese Imperial Railway, and that the order for 6000 tons for the Cananea, Yaqui & Pacific has been placed for export to Mexico. The first named company also has secured a contract for 10,000 tons of steel rails for the extension of the Victorian State Railway system in Australia, as well as an order for heavy girder rails for New Zealand.

The Transcontinental Railway Commission has awarded contracts for 65,371 tons of steel rails to the Dominion Iron & Steel Company and the Lake Superior Corporation. The Dominion Iron & Steel Company gets 44,000 tons, and it is understood the contract price is \$34 a ton, meaning \$1,496,000. The contract with the "Soo" Company is for 21,371 tons, which at \$34 a ton means \$726,000.

Trade in the South is generally dull. Recently a few thousand tons of spot pig iron were offered at 50c. below regular quotations and was so quickly absorbed that it would indicate a need for iron among consumers. The trade in the Middle West is dull and listless. Steel in billets and shapes is in better demand and prices hold firm.

Baltimore

July 23—Exports for the week from this port included a considerable quantity of rails and fastenings, as follows: 1030 tons rails, 36 tons fastenings, and 750 tons steel ties to Bocas del Toro; 453 tons rails, and 393 tons steel ties to Port Limon; 4082 tons rails and 518 tons splices to Colon, Panama.

Imports for the week included 246 casks ferrosilicon. Arrivals of iron ore were 4500 tons from Cuba.

Birmingham

July 22—An optimistic feeling prevails among the Alabama manufacturers of pig iron despite the fact that there is but little buying going on at present. A few thousand tons of iron, offered on the market in this district recently at a price fifty cents under the regular quotations, was quickly taken. Some small sales of iron for delivery during the first half of 1908 are still being made, but it is stated that the price is under \$18.50 per ton, No. 2 foundry. The iron offered practically for spot delivery recently was quoted at \$21 per ton, No. 2 foundry, the quotation that is given for iron for delivery during the fourth quarter of this year. Outside of this little offering there is no spot iron to be had in this district. The July production in Alabama is likely to show a considerable falling off, the decreased ore supply causing several furnaces either to bank fires or run slack for several days at a time.

Charcoal iron is in good demand and readily brings \$26 per ton. The Shelby Iron Company has almost covered its probable make for the balance of the year. This company has let contracts for the construction of four stoves at its furnace plant at Shelby, Ala. Later on steps will be taken to rebuild one of the present furnaces, probably ceasing the manufacture of charcoal iron. This company has two furnaces in operation side by side, one manufacturing charcoal and the other coke iron.

The steel situation is still bright. The production is again steady and every ton finds a demand. No apprehension as to the future in steel is expressed.

Chicago

July 22—Except for a sprinkling of orders for small amounts of pig iron for delivery within the next three months, the market is lifeless. There is no disposition by buyers to contract for iron now, though inquiries show some interest in needs of the last quarter and the first quarter of 1908. It is the expressed belief of dealers in pig iron that the market will remain quiet but firm until the end of the summer and then become active. To all appearances there will be an increasing business in small lots for quick delivery throughout the summer, for melters are hurrying forward orders and running short, in many cases, on their immediate needs.

For third quarter delivery Northern No. 2 brings \$25.50 and Southern No. 2 \$20.50@21; Birmingham (\$24.50@25.35 Chicago). Fourth quarter prices are about \$25 for Northern and \$20 Birmingham for Southern, with the price shading upward for intermediate deliveries.

Coke is quiet and shows a downward tendency in prices, the demand being light and shipments abundant. Connellsville 72-hour brings \$5.75 and West Virginia 72 hour \$5.40.

Cleveland

July 23—Duluth, and Two Harbors, Minn., and Superior, Wis., are completely tied up with the ore-handlers' strike and in consequence receipts from up lake so far this week have been very light. The first half of July, however, shows a larger tonnage movement than in June, though it is anticipated that the ore-handlers' strike will cause a falling off for the balance of the month.

The pig-iron market is without feature; demand is slow and prices easy. No. 2 foundry is selling for spot delivery at \$23, and offerings are not attracting much attention. Quotations for the third and fourth quarter: Bessemer, \$23.90@24.25; No. 1 foundry, \$23.50@24; No. 2, \$23@23.50; No. 3, \$22.50@23; No. 2 Southern, \$23.85@24.85; Gray Forge, \$22@22.25 per ton.

Philadelphia

July 24—Business in pig iron has fallen still lower. Large consumers in this territory are satisfied to let the market drift as it pleases. The only sign of life is in offerings of foreign iron. Despite hot weather foundry consumption is heavy, while mill consumption is moderate. Low phosphorus is \$27. No. 2 foundry, for fourth quarter, \$22.50; forge, \$22, with probability of lower quotations.

Steel Billets—The quotation today is \$32.50, with little business to report. Consumers are not disposed to enter into new engagements and manufacturers have all they can attend to.

Bar Iron—Mills are resuming and manufacturers have enough secured business to make them rather indifferent. There are inquiries for larger quantities of common iron, but no certainty of orders being placed before August.

Sheets—The larger users are taking no interest in the market. Manufacturers expect to be busy all through the year.

Pipes and Tubes—Merchant pipe is in good supply for immediate delivery. Tubes command the customary extreme figures, but new business is unimportant.

Plates—The mills are well supplied with business and are pushing production in order to be in shape to handle car building orders.

Structural Material—There is no business in large orders. Small orders are more numerous. Quotations are close to 2 cents.

Steel Rails—Light section business is good and traction orders are coming along. A good business has been done in exports.

Scrap—Scrap has weakened, or rather fancy quotations have been wiped out. No. 1 steel scrap is today \$17.50; choice railroad scrap, \$19; old iron rails, \$25.

Pittsburg

July 24—Interest is centered principally in the situation at Lake Superior, and developments in that quarter are being eagerly watched.

In finished iron and steel lines there is but little change. There is some new buying, but the tonnages are small, and in the aggregate the business is regarded as fairly large for an extremely dull period of the year. The Carnegie Steel Company has taken several small orders for standard steel rails, and with the Ohio works on billets this company is practically sold up for the year. It is reported, but not officially confirmed, that the Carnegie company is making important changes in the process for manufacturing rails at its Edgar Thomson works. One of the changes contemplates making 4-ton, instead of 2-ton ingots. In order to accomplish this the soaking pits will have to be completely rebuilt. The improve-

ments contemplated will cost several million dollars, but better rails will be produced.

An effort is being made to adjust the wage difference between the Amalgamated Association of Iron, Steel and Tin Workers and the Republic Iron and Steel Company. The matter is now being considered by the board of conciliation, which is in session at Cambridge Springs, Penn. This board has been increased to five members, and is composed of Henry W. Heedy and Warner Arms, of Youngstown, representing the Republic company, and Benjamin Davis and John J. Buckley, representing the Amalgamated Association. These four have selected M. J. Hanley, a retired mill manager of Muncie, Ind., as the fifth member. Both sides are well represented at the conference, and are advancing arguments in support of their claims. The workers are insisting on a stiff advance, and the manufacturers are showing that an increase in pay is not warranted.

Pig Iron—The trouble in the ore region has already had the effect of strengthening the pig-iron market. Late last week sales of bessemer iron aggregating 3200 tons, were made at \$22.50, Valley furnaces, for July delivery, a cut of \$1 a ton from sales previously made for third-quarter delivery. Today a sale of 1000 tons of bessemer was made at \$22.75, Valley, for prompt shipment. It is doubtful now that this price can be duplicated, and unless the ore strike is promptly broken prices are likely to advance. The Valley furnaces are well supplied with ore, and some will not be affected by the strike for from two to four months. The Carnegie Steel Company has blown in one Mingo furnace that was out for repairs, and this week furnace K, of the Edgar Thomson group went out for relining. According to the monthly report of the Bessemer Pig Iron Association 97 per cent. of the furnaces using Lake Superior ore were in operation on July 1. The United States Steel Corporation is operating 92 of its 93 furnaces, and all of the furnaces of the association, the Pennsylvania Steel Company, and the Cambria Steel Company are in operation. Foundry iron is lower, sales having been made at \$23.50, Valley furnaces, and gray forge is held firmly at \$22.90, Pittsburg, for any delivery.

Steel—There is an improvement in deliveries on billets, and the price is firm at \$30 for bessemer and \$31.50@32 for open hearth. Sheet bars are quoted at \$31. The Lackawanna Steel Company yesterday sold 500 tons of bessemer billets. Steel bars remain at 1.60c., and plates at 1.70c.

Sheets—There will be no advance in prices of galvanized sheets as was expected, owing to a decline in prices of spelter. The market continues strong, black sheets being held firmly at 2.60c., and galvanized at 3.75c for No. 28 gage.

Ferro-Manganese — The market is stronger for prompt shipment, one sale having been made at \$65. For late delivery \$61@62 is quoted.

Metal Market

NEW YORK, July 24.
Gold and Silver Exports and Imports
At all United States Ports in June and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
June 1907..	\$23,872,140	\$ 2,140,769	Exp. \$21,731,371
" 1906..	3,266,392	2,369,080	" 887,312
Year 1907..	36,300,732	21,444,074	" 14,856,658
" 1906..	31,610,714	62,537,778	Imp. 30,927,064
Silver:			
June 1907..	5,360,599	3,448,712	Exp. 1,911,887
" 1906..	4,518,386	3,760,012	" 758,374
Year 1907..	33,437,227	22,367,777	" 11,069,450
" 1906..	29,219,209	23,676,828	" 5,542,381

These statements cover the total movement of gold and silver to and from the United States. These figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York
For week ending July 20 and years from Jan. 1

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	\$92	\$ 198,861	\$1,064,261	\$ 200,010
1907.....	28,864,125	6,416,648	25,729,477	1,106,574
1906.....	5,900,573	45,109,063	34,942,644	1,272,471
1905.....	37,914,943	793,629	18,030,790	2,167,401

Exports of silver for the week were chiefly to London. Imports for the week, both gold and silver, were from the West Indies, Mexico and South America.

The foreign trade of the United States for the six months ended June 30 is reported as follows by the Bureau of Statistics of the Department of Commerce and Labor:

	1906.	1907.
Exports, merch'dise..	\$857,842,728	\$940,450,318
Imports " ..	637,359,330	751,258,850
Excess, imports....	\$220,483,398	\$189,191,468
Add excess of exports.....		11,069,450
Add excess of exports, gold.....		14,856,658
Total export balance.....		\$215,117,576

The gold and silver movement in detail will be found in the table at the head of this column.

The joint statement of all the banks in the New York Clearing House for the week ending July 20 shows loans \$1,106,250,000, an increase of \$414,100; deposits, \$1,072,991,300, an increase of \$2,231,500, as compared with the previous week. Reserve accounts show:

	1906.	1907.
Specie.....	\$193,066,300	\$204,768,300
Legal tenders.....	87,509,500	72,567,600
Total cash.....	\$280,575,800	\$277,335,900
Surplus.....	\$19,391,000	\$ 9,088,075

The surplus over legal requirements this year shows an increase of \$2,768,900 as compared with the previous week.

Indian Exchange has been slightly easier, the Council bills offered in London bringing an average of 16.03d. per rupee. Buying of silver in London for Indian account has been steady.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars.....	\$0.53 1/2	\$0.55 1/2
Peruvian soles and Chilean.....	0.49	0.51
Victoria sovereigns.....	4.85	4.87
Twenty francs.....	3.85	3.89
Spanish 25 pesetas.....	4.78 1/2	4.80

SILVER AND STERLING EXCHANGE.

July.	Sterling Exchange.	Silver.		July.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
18	4.8680	68 1/2	31 1/2	22	4.8680	69 1/2	31 1/2
19	4.8690	68 1/2	31 1/2	23	4.8690	68 1/2	31 1/2
20	4.8690	68 1/2	31 1/2	24	4.8700	68 1/2	31 1/2

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals

July.	Copper.			Tin.	Lead.	Spelter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.			New York, Cts. per lb.	St. Louis, Cts. per lb.
18	21 1/4 @22	20 3/4 @21	94	40 1/2	5.25	6.00 @6.05	5.85 @5.90
19	21 1/4 @22	20 3/4 @21	94	40 1/2	5.25	6.00 @6.05	5.85 @5.90
20	21 1/4 @22	20 3/4 @21	.....	40 1/2	5.25	6.00 @6.05	5.85 @5.90
22	21 1/4 @22	20 3/4 @21	94 1/2	41 1/2	5.25	6.00 @6.05	5.85 @5.90
23	21 1/4 @22	20 3/4 @21	93 1/2	41 1/2	5.25	6.00 @6.05	5.85 @5.90
24	21 1/4 @22	20 3/4 @21	96	41 1/2	5.25	6.00 @6.05	5.85 @5.90

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars, and represent the bulk of the transactions as made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting and Refining Company for near-by shipments of desilverized lead in 50-ton lots, or larger. The quotations on spelter are for ordinary western brands; special brands command a premium.

Copper—The market continues in an unsatisfactory state. Business is at a minimum, and the one consolation rests in the fact that any change in conditions can only be for the better; in fact, the falling off has been so marked that it must be due to a holding back of business among ultimate consumers. This business, however, will be forthcoming as soon as confidence in the future of the market is restored. Meanwhile independent sellers are eagerly competing for such small business as presents itself, particularly for export, and prices are again somewhat lower. The close is quoted 21 1/4@22c. for Lake copper; 20 1/2@21c. for electrolytic in ingots, cakes and wirebars; 19 3/4@20 1/4c., for casting copper.

The fluctuations in the London market have been narrow throughout the week, the market having the appearance of a deadlock between the contending factions. The close is quiet at £96 for spot, £88 for three months'.

Refined and manufactured sorts we quote: English tough, £96; best selected, £100; strong sheets, £107.

Tin—The London market moved within very narrow limits. The squeeze of the shorts seems to be over for the present, in consequence of which the contango between spot and three months' tin has gradually become smaller. The market closes over there at £183 5s. for spot, £181 5s. for three months.

Business in this market is of a retail nature only. The spot supplies, which are not very large, are closely held by a few firms, who are realizing premiums over the import price, and for such tin as is wanted 4 1/4c. is being paid by consumers.

Lead—The quotation for desilverized lead remains unchanged at 5.25c. New York. Outside brands are freely offered at a discount.

The London market has been quite firm, and the close is cabled at £20 10s. for Spanish lead, £29 12s. 6d. for English lead.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of June 29: The price of pig lead has been 95.75 reales per quintal; silver, 13.88 reales per ounce. Exchange is 28.20 pesetas to £1. The price of lead on current exchange is equal to £19 os. 9d. per long ton, f.o.b. Cartagena. Exports for the week were 809 tons argentiferous and 100 tons desilverized lead to Marseilles; 250 tons desilverized to Hamburg; a total of 1159 tons.

Spelter—Business has quieted down, and the market is barely steady. Such transactions as take place are of a retail character. The close is easy at 6@6.05c. New York, 5.85@5.90c. St. Louis.

The London market declined further, and the close is cabled at £23 15s. for good ordinaries, £24 for specials.

Zinc Sheets—The base price has been reduced 25c., and is now \$8.35 per 100 lb.—less discount of 8 per cent.—f.o.b. cars at Lasalle and Peru, in 60-lb. cases for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.50c. per 100 lb. The minimum weight on a carload of sheet zinc to all Eastern points is 36,000 lb., equivalent to 60 casks of 600 lb. each.

Antimony—The market shows no signs of life and the same condition exists abroad. There seems to be a slight tendency to better prices in the foreign market but quotations at any material advance are not considered reliable. Quotations are 11@11 1/2c. for Cookson's; 10@10 1/2c. for Hallett's; 9 1/2@10 1/4c. for ordinary metals.

Nickel—For large lots, New York or other parallel delivery, the chief producer quotes 45@50c. per lb., according to size and terms of order. For small quantities prices are 50@65c., same delivery.

Quicksilver—Current prices in New York are \$41 per flask of 75 lb. for large quantities and \$42 for smaller orders. San Francisco orders are \$38@39 per flask, according to quantities, for domestic orders, and \$37@37.50 for export. The London price is £7 per flask, but £6 16s. 3d. is quoted by jobbers.

Platinum—An unexpected stiffening occurred on Tuesday in the platinum market, but no reason is assigned for the increase in price. The demand seems to be fairly good for this time of the year and no shortage is apparent. Quotations are as follows: Ordinary metal, \$27; hard metal, \$29@29.50; scrap is quoted at \$22@22.50 per ounce.

British Metal Imports and Exports

Copper—Imports and exports of copper in Great Britain for the six months ended June 30, were as follows, in long tons; the totals giving the copper contents of all material:

	1906.	1907.	Changes.
Copper ore.....	45 689	53,545	I. 7,856
Matte and precipitate...	36 142	34,020	D. 2,122
Fine copper.....	37,289	33,307	D. 3,982
Total imp., fine copper.	59,929	55,672	D. 4,257
Exports.....	21,128	27,139	I. 6,011
Re-exports.....	8,854	10,831	I. 1,977
Total exports.....	29,982	37,970	I. 7,988
Balance, imports.....	29,947	17,702	D. 12,245

Of the imports this year the United States furnished 129 tons of matte and 10,084 tons of fine copper, against 1996 tons of matte, and 11,963 tons of copper in 1907.

Tin—Imports and exports of tin in Great Britain for the six months ended June 30 were as follows, in long tons.

	1906.	1907.	Changes.
Straits.....	19,289	17,094	D. 2,195
Australia.....	2,090	2,605	I. 515
Other countries...	1,453	1,649	I. 196
Total imports..	22,832	21,348	D. 1,484
Exports.....	3,883	4,561	I. 678
Re-exports.....	17,483	14,571	D. 2,912
Total exports...	21,366	19,131	D. 2,235
Balance, imp....	1,466	2,217	I. 751

Imports of tin ore and concentrate were 11,256 tons in 1906, and 10,610 tons in 1907, a decrease of 646 tons. Of the imports this year 8526 tons were from Bolivia.

Lead—Imports and exports of lead in Great Britain for six months ended June 30, were, in long tons:

	1906.	1907.	Changes.
United States.....	9,541	7,297	D. 2,244
Spain.....	55,510	53,366	D. 2,144
Australia.....	25,900	25,620	D. 280
Germany.....	9,370	3,258	D. 6,112
Other countries.....	1,791	5,664	I. 3,903
Total imports.....	102,112	95,235	D. 6,877
Exports.....	22,486	25,807	I. 3,321
Balance, imports.....	79,626	69,428	D. 10,198

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

Spelter—Imports and exports of spelter in Great Britain for the six months ended June 30 were, in long tons:

	1906.	1907.	Changes.
Spelter.....	43,843	45,218	I. 1,375
Zinc sheets.....	9,309	10,106	I. 797
Total imports.....	53,152	55,324	I. 2,172
Exports.....	3,823	2,549	D. 1,274
Balance, imports..	49,329	52,775	I. 3,446

Imports of zinc ore are not reported separately.

Quicksilver—Imports of quicksilver into Great Britain for the six months ended June 30, were 1,934,771 lb. in 1906, and 2,803,946 lb. in 1907; an increase of 869,175 lb. Re-exports of imported metal were 985,106 lb. in 1906, and 1,131,722 lb. in 1907; an increase of 146,616 lb. this year.

Wisconsin Ore Market

Platteville, Wis., July 20—The price of 60 per cent. ore remained about the same as last week, selling at \$47. Zinc seems to hold its own, and all the producers are confident that the price will not go below \$42. The Platteville district is now running at full capacity again as the various plants that were making repairs to their mills have nearly all resumed work, and are marketing the ore just as fast as it is mined, leaving no surplus in the bins. The weather has been ideal, and with the continued supply of cars, which is promised by the roads, the market will be well supplied for months to come. There are several new mills being built in the district, and new contracts are coming in fast, giving an assurance of plenty of ore still to be mined. Several new roasters are also being built, and put into operation as fast as possible.

Lead is still off in price, being due mostly to an over-production at the smelters, and this price may last for some time to come; but the bins are being stocked up as the producers will not sell at this figure. Lead is still selling at \$29.50 per 100 lb. for 75 per cent. lead. Sulphur and dry bone hold their own in price.

Following is the shipment of the district, by camps, for the week ending July 20, 1907:

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville.....	117,450	.....	.....
Buncombe-Hazel Green..	938,100	.....	.....
Mineral Point.....	557,000	54,500	105,900
Highland.....	488,570	.....	.....
Benton.....	326,390	62,220	.....
Linden.....	237,200	.....	.....
Galena.....	136,400	.....	.....
Rewey.....	129,000	.....	.....
Cuba City.....	69,100	85,200	.....
Livingston.....	56,000	.....	.....
Total for week.....	3,055,210	201,920	105,900
Year to July 20.....	57,142,605	2,274,720	335,060

Missouri Ore Market

Joplin, Mo., July 20—The highest price reported paid for zinc was \$50.50 per ton, on an assay base of \$45@48.50 per ton of 60 per cent. zinc. The average price was \$45.90.

The highest price reported paid for lead was \$61 per ton, with medium grades sell-

ing at \$58@60. The average price was \$59.02, a gain of \$2 per ton.

With the New Jersey zinc interests attempting to bear the zinc market, it is noteworthy that the American Zinc, Lead and Smelting Company, and other smelters, controlled by the United States Smelting, Refining and Mining Company, are keeping prices up, with a higher average price. A representative of the new smelter at Bartlesville, in which the Guggenheims are supposed to be interested, was in the district during the week endeavoring to make five-year contracts for zinc ore on the Belgian plan of purchase.

One producer was reported locally as having signed a contract to deliver 100 tons per week, beginning in September.

Following are the shipments of zinc and of lead from the various camps of the district for the week ending July 20:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville.	3,177,560	419,660	\$ 85,222
Joplin.....	2,858,160	220,490	74,880
Galena.....	1,322,660	110,700	34,237
Duenweg.....	1,149,900	57,350	28,661
Alba-Neck City.....	863,600	.....	21,158
Granby.....	750,000	35,000	11,350
Aurora.....	472,500	15,050	10,212
Prosperity.....	265,770	81,610	8,570
Oronogo.....	263,590	.....	6,281
Spurgeon.....	265,770	29,520	6,097
Badger.....	235,310	.....	5,882
Baxter Springs.....	165,510	.....	3,931
Carthage.....	134,020	.....	3,283
Sherwood.....	99,210	28,270	3,073
Zincite.....	79,290	.....	1,942
Sarcozie.....	62,930	.....	1,445
Reeds.....	43,620	.....	1,003
Totals.....	12,149,400	997,650	\$307,227

29 weeks.....351,110,520 52,185,220 \$10,280,887
Zinc value, the week, \$278,783; 29 weeks, \$8,181,023
Lead value, the week, 28,444; 29 weeks, 2,099,864

Average prices for ore in the district, by months, are shown in the following table:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January ..	47.38	45.84	January ..	75.20	83.53
February ..	47.37	47.11	February ..	72.83	84.58
March	42.68	48.66	March	73.73	82.75
April.....	44.63	48.24	April.....	75.13	79.76
May.....	40.51	45.98	May.....	78.40	79.56
June.....	43.83	44.82	June.....	80.96	73.66
July.....	43.25	.....	July.....	74.31	.....
August.....	43.56	.....	August.....	75.36	.....
September.....	42.58	.....	September.....	79.64	.....
October.....	41.55	.....	October.....	79.84	.....
November.....	44.13	.....	November.....	81.98	.....
December.....	43.68	.....	December.....	81.89	.....
Year.....	43.24	.....	Year.....	77.40	.....

Chemicals

New York, July 24—The general market is heavy and inactive, due to the usual depression of the summer. This condition prevails along practically all lines of chemicals in the local market.

Copper Sulphate—The market for this salt is neither weak nor strong. Some business is being done in a quiet way, and sales are reported at \$7 per 100 lb. for carload lots, and \$7.25 for smaller quantities according to seller and terms of sale.

Nitrate of Soda—The market for nitrate of soda continues strong, and prices are easily maintained. The de-

mand at present is not as strong as during the past few weeks. Shipments for July, while normal, were not as heavy as for June but figures are not yet available. We quote nitrate of soda for spot delivery, nominally at 2.50c. for 96 per cent., and 95 per cent. at 2.45@2.47½c. These grades for 1907 delivery are quoted at 2.47½c., and 2.42½c., respectively.

Sulphur—Emil Fog & Sons, in their letter from Messina, Italy, under date of July 1, report that the definite board of directors of the Italian *Consorzio* has been elected and consists of mine owners and lawyers, with the total exclusion of the commercial element.

It is believed, in Italy, that the large stock of sulphur, bought at a cheap figure from the Anglo-Sicilian Company, should have been unloaded on the United States market. The low price, at which it could have been sold, would have tended to undersell the Louisiana market, and increase the consumption of sulphur at the expense of iron pyrites. The result of not disposing of this sulphur is that stocks are increasing at an alarming rate, and it has become a problem where to store the raw material coming from the mines.

Exports of sulphur from Italy during May were reported to be 23,260 tons, compared with 37,180 in May, 1906, a decrease of 13,920 tons. The total exports from January to May inclusive were 174,327 tons, against 219,446 tons in the same period of 1906. These exports show a decrease of 45,119 tons for the period.

British Chemical Trade—Exports of heavy chemicals from Great Britain for six months ended June 30, were as follows in cwt. of 112 lb. each:

	1906.	1907.	Changes.
Bleaching powder....	481,660	551,069	I. 69,409
Muriate of ammonia,	56,987	85,954	I. 28,967
Soda ash.....	789,435	1,101,569	I. 312,131
Bicarbonate of soda.	178,319	208,034	I. 29,713
Caustic soda.....	794,958	720,446	D. 74,512
Soda crystals.....	81,904	82,225	D. 321
Soda sulphate.....	428,678	450,446	I. 21,768
Sulphuric acid.....	51,092	39,799	D. 11,293

Copper sulphate exports were 37,765 tons, in 1906, and 38,956 tons, in 1907; an increase of 1191 tons.

Imports of chemicals and raw materials into Great Britain for the six months ended June 30 were, in long tons:

	1906.	1907.	Changes.
Nitrate of potash.....	104,434	119,491	I. 15,057
Nitrate of soda.....	62,097	77,842	I. 15,745
Phosphates.....	241,396	261,217	I. 19,821
Sulphur.....	213,836	180,894	D. 32,942
Pyrites.....	389,410	410,082	I. 30,672

Estimating the sulphur contents of the pyrite, the total imports of sulphur in 1906 were 369,601 tons, and 344,927 tons in 1907, a decrease of 24,673 tons.

Mining Stocks

New York, July 24—The market has shown no life and has been purely professional with little interest taken by the outside public. Amalgamated Copper has remained quiet but toward the end of the

week it advanced slightly and closed at \$92, higher than a week ago. American Smelting common closed at \$117 on rather light sales for this stock. United States Steel, both common and preferred, was weak and the strength which the common had gained, due to rumors of an increase in dividend, was lost in the uncertainty existing in the iron ranges of Minnesota. The common sold off \$1.50 to \$36.50.

During the week 100 shares of Homestake were sold at \$82.50 which is an advance of \$9.50 over a similar sale a week ago. This would indicate that the starting of the mill and the overcoming of the difficulties have restored confidence in this stock. The curb has been listless except in the Nevada stocks and certain of the coppers. British Columbia copper announced an initial dividend of 40c. payable Sept. 4; and there have also been rumors of an amalgamation between this company and Dominion Copper, which has caused the latter stock to strengthen slightly. The Cobalt stocks continued to attract little attention and are generally weak. Several of the Nevada stocks were largely dealt in and for the time being seem to be quite active.

Boston

July 23—There has been a monotonous dullness in the copper share market, although the tone of late has been firm. The consensus of opinion is that the red metal has got to seek a lower level.

Prices, as a rule, are slightly above those of a week ago, even though there is little life. The placing of Amalgamated on a regular 8 per cent. dividend basis has given considerable inspiration, although it is feared that this was done to offset the declining tendency of copper metal. Copper Range is \$1.50 better than a week back at \$80.50 Mohawk \$1.75 better at \$82.75 and North Butte rose \$3 to \$84, with reaction to \$82. Amalgamated yielded \$1.62½ to \$88.62½, but rallied to \$92.50 today, closing firm. Calumet & Arizona is up \$4 to \$167 while Calumet & Hecla is off \$25 to \$800 even. Quincy closes with a net gain of \$2, at \$118. Tamarack has varied from \$105 to \$109. Osceola closes at \$127 and Wolverine at \$163.50.

Utah Consolidated still continues a mystery. It recovered from \$45.50 to \$47, and then went off to \$43.25 on only ordinary trading, with the final today a trifle better than a week ago at \$46. The Boston Consolidated sent over 20,000 tons of ore to the Garfield smelter during June.

Bingham Consolidated, it is said, has purchased a new smelter site, paying \$50,000. This is to evade the smoke nuisance. Balaklala is reported to have \$700,000 cash on hand, or more than enough for present construction requirements.

Adventure is still diamond drilling for the Baltic lode. There is talk of con-

solidation of Shannon and the Arizona Copper Company. Boston & Corbin has been the curb feature, advancing \$1 to \$15, its best price, losing the advance subsequently.

Colorado Springs

July 20—Trading in mining stocks on the local exchange has been better this week than for several weeks past. Just now Nevada stocks seem to be off a little and not so much in favor with the local people. Buyers are beginning to turn their attention more to Cripple Creek stocks again. The most active traders this week were Elkton, El Paso and Gold Sovereign. These stocks, however, dropped a few points below last week's quotations.

STOCK QUOTATIONS

NEW YORK July 23		BOSTON July 23	
Name of Comp.	Clg.	Name of Comp.	Clg.
Alaska Mine.....	1	Adventure.....	...
Am. Nev. M. & P. Co.	1	Allouez.....	...
Amalgamated*.....	92	Am. Zinc.....	34
Anaconda*.....	57 1/2	Arcadian*.....	6 1/2
Balakiala.....	8 1/2	Atlantic.....	12 1/2
British Col. Cop.....	10 1/2	Bingham.....	...
Buffalo Cobalt.....	2 1/2	Boston Con.....	26 1/2
Butte & London.....	...	Calumet & Ariz.....	167
Butte Coalition.....	25 1/2	Calumet & Hecla.....	800
Butte Cop. & Zinc.....	...	Centennial.....	...
Cobalt Contact.....	45	Con. Mercur.....	...
Colonial Silver.....	1 1/2	Copper Range.....	80 1/2
Cum. Ely Mining.....	9	Daly-West.....	16
Davis Daly.....	11 1/2	Franklin.....	14 1/2
Dominion Cop.....	5 1/2	Greene-Can.....	15 1/2
El Rayo.....	4 1/2	Isle Royal.....	19 1/2
Foster Cobalt.....	75	La Salle.....	15
Furnace Creek.....	1/2	Mass.....	...
Giroux Mine.....	8 1/2	Michigan.....	15
Gold Hill.....	1 1/2	Mohawk.....	82 1/2
Granby, New.....	...	Mont. C. & C. (new).....	2 1/2
Greene Gold.....	1 1/2	Nevada.....	...
Greene G. & S.....	1 1/2	North Butte.....	82 1/2
Greenw'r & D. Val.....	5	Old Colony.....	...
Guanajuato.....	3 1/2	Old Dominion*.....	44
Guggen. Exp.....	212 1/2	Osceola*.....	127
Hanapah.....	50	Parrot.....	...
McKinley Dar.....	1	Phoenix.....	...
Micmac.....	4 1/2	Quincy.....	118
Mines Co. of Am.....	1 1/2	Rhode Island.....	5 1/2
Mitchell Mining.....	3	Santa Fe.....	...
Mont. Sho. C. (New).....	...	Shannon.....	17 1/2
Nev. Utah M. & S.....	5 1/2	Tamarack*.....	107
Newhouse M. & S.....	16	Trinity.....	23 1/2
Nipissing Mines.....	10 1/2	United Cop., com.....	64 1/2
Old Hundred.....	2 1/2	U. S. Oil.....	11
Silver Queen.....	1 1/2	U. S. Smg. & Ref.....	48
Stewart.....	2 1/2	U. S. Sm. & Re. pd.....	43
Tennessee Cop'r.....	...	Utah Copper.....	46 1/2
Union Copper.....	...	Victoria.....	7 1/2
Utah Apex.....	6 1/2	Washington.....	...
West Columbus.....	10	Winona.....	...
		Wolverine.....	163 1/2
		Wyandotte.....	1 1/2

N. Y. INDUSTRIAL		
Am. Agri. Chem.....	...	...
Am. Smelt. & Ref.....	117	...
Am. Sm. & Ref. pf.....	106	...
Bethlehem Steel.....	...	...
Colo. Fuel & Iron.....	...	...
Federal M. & S. pf.....	...	...
Inter. Salt.....	16	...
National Lead.....	...	...
National Lead, pf.....	...	...
Pittsburg Coal.....	...	...
Republic I. & S.....	28 1/2	...
Republic I. & S. pf.....	84	...
Bloss-Sheffield.....	57 1/2	...
Standard Oil.....	500 1/2	...
Tenn. C. & I.....	...	...
U. S. Red. & Ref.....	36 1/2	...
U. S. Steel.....	100 1/2	...
U. S. Steel, pf.....	26 1/2	...
Va. Car. Chem.....	...	...
Va. I. Coal & Coke.....	...	...

ST. LOUIS July 20		
N. of Com.	High.	Low.
Adams.....	40	30
Am. Nettle.....	04	03
Center Cr'k.....	2.50	2.15
Cent. C. & C.....	68.00	67.00
C. C. & C. pd.....	80.00	75.00
Cent. Oil.....	110.00	100.00
Columbia.....	7.00	4.50
Con. Coal.....	28.00	27.00
Doe Run.....	160.00	150.00
Gra. Bimet.....	35	30
St. Joe.....	18.00	16.00

S. FRANCISCO July 17

Name of Comp.	Clg.
COMSTOCK STOCKS	
Belcher.....	.29
Best & Belcher.....	.75
Caledonia.....	.30
Chollar.....	.11
Con. Cal. & Va.....	.60
Crown Point.....	.42
Exchequer.....	.21
Gould & Curry.....	.16
Hale & Norcross.....	.63
Mexican.....	.65
Ophir.....	2.10
Overman.....	.14
Potosi.....	.14
Savage.....	.73
Sierra Nevada.....	.40
Union.....	.36
Utah.....	.06
Yellow Jacket.....	.90
TONOPAH STOCKS	
Golden Anchor.....	.19
McNamara.....	.29
Montana-Pitts. ex.....	.24
North Star.....	.17
Rescue.....	.17
GOLDFIELD STOCKS	
Black Ants.....	.05
Blue Bull.....	.33
Columbia Mt.....	.62
Comb. Frac.....	2.80
Conquerer.....	.12
Daisy.....	2.40
Florence.....	5.60
Frances-Mohawk.....	1.25
Goldfield Con.....	8.47
Grandma.....	.18
Great Bend.....	.77
Red Hills.....	.54
St. Ives.....	.98
BULLFROG STOCKS	
Amethyst.....	.28
Bonnie Claire.....	.54
Conflower Con.....	.40
Montgomery Mt.....	.14
Original.....	.07
MANHAT'N STOCKS	
Gold Wedge.....	.07
Manhattan Mg.....	.06
Pine Nut.....	.07
Ruby Wonder.....	.25
Stray Dog.....	.17
Yellow Horse.....	.04

NEVADA July 24

(Weir Bros. & Co., New York)	
TONOPAH STOCKS	Clg.
Tono'h Mine of N.....	12.75
Montana Tonop'h.....	3.25
Belmont.....	3.00
Tonopah Midway.....	1.03
West End Con.....	.80
Jim Butler.....	1.02
GOLDFIELD STOCKS	
Sandstorm.....	.45
Kendall.....	.30
Red Top.....	4.25
Jumbo.....	4.25
Goldfield Mining.....	1.55
Dia'dfield B. B. C.....	.25
Atlanta.....	.61
Mohawk.....	17.00
Silver Pick.....	.64
Laguna.....	1.50
BULLFROG STOCKS	
Mont. Shoshone C.....	6.75
Tramps Con.....	.47
Gold Bar.....	.70
Bullfrog Mining.....	.16
Bullfrog Nat. B.....	.22
Homestake Con.....	...
MANHAT'N STOCKS	
Manhattan Con.....	.46
Manhat'n Dexter.....	.14
Jumping Jack.....	.08
Stray Dog.....	.16
Indian Camp.....	.05
COLO. SPRINGS July 20	
Name of Comp.	Clg.
Acacia.....	8 1/2
Black Bell.....	...
C. C. Con.....	4 1/2
Dante.....	5
Doctor Jack Pot.....	7
Elkton.....	55
El Paso.....	42
Findlay.....	...
Gold Dollar.....	...
Gold Sovereign.....	3 1/2
Isabella.....	22
Index.....	...
Jerry Sample.....	6
Jenny Johnson.....	...
Mary McKinney.....	...
Pharmacist.....	...
Portland.....	1.16
Un. Gold Mines.....	7 1/2
Vindicator.....	78
Work.....	17

New Dividends

Company.	Payable.	Rate.	Amt.
Acacia.....	July 10	\$0.01	\$15,000
Alaska Mexican.....	July 29	0.30	54,000
Alaska Treadwell.....	July 29	1.00	200,000
Amalgamated.....	Aug. 26	2.00	3,961,758
Am. Zinc, Lead & Smg.....	Aug. 1	0.75	45,000
Arizona Copper, pfd.....	July 30	0.54	1,007,705
Arizona Copper, def.....	July 30	0.54	137,040
British Columbia.....	Sept. 4	0.40	122,000
Boston & Montana.....	...	12.00	1,800,000
Cambria Steel.....	Aug. 15	0.75	675,000
Camp Bird, Ltd.....	Aug. 3	0.24	196,800
Consolidation Coal, com.....	July 31	1.50	153,750
El Oro.....	July 12	0.36	388,800
Newhouse.....	Aug. 31	0.50	300,000
New River Coal, pfd.....	Aug. 1	1.50	56,425
Osceola.....	July 29	7.00	673,500
Philadelphia Gas.....	Aug. 1	0.75	434,250
Silver King Coalition.....	July 31	...	187,500
Tenn. C. I. & R. R., com.....	Aug. 1	1.00	225,536
Tenn. C. I. & R. R., pfd.....	Aug. 1	2.00	4,960
Tenn. Copper.....	Aug. 15	2.00	350,000
United Copper.....	Aug. 6	1.75	787,500
U. S. C. I. Pipe & Fdy., com.....	Sept. 2	1.00	121,063
U. S. C. I. Pipe & Fdy., pfd.....	Sept. 2	1.00	121,063

Assessments

Company.	Delinq.	Sale.	Amt.
Alpha, Nev.....	July 30	Aug. 20	\$0.05
Bader, Cal.....	July 24	Aug. 13	0.05
Birchville, Cal.....	July 10	Aug. 1	0.02
Cedar Creek, Ida.....	July 13	Aug. 3	0.003
Christmas, Utah.....	July 15	Aug. 6	0.005
Crown Point, Nev.....	July 24	Aug. 14	0.10
Emerald, Utah.....	Aug. 15	Sept. 7	0.01 1/2
Exchequer, Nev.....	July 8	July 30	0.05
Giant, Utah.....	July 10	July 31	0.01
Headlight, Ida.....	July 20	Aug. 20	0.003
Loon Creek, Ida.....	July 17	Aug. 5	0.01
McKinley, Ida.....	July 27	Aug. 29	0.00 1/2
Mexican, Nev.....	July 15	Aug. 5	0.10
Norrison, Utah.....	July 19	Aug. 3	0.01
Oquirrh, Utah.....	July 22	Aug. 12	0.00 1/2
Reindeer, Ida.....	Aug. 18	Aug. 27	0.01
Sheba G. & S., Utah.....	July 30	Nov. 2	0.10
Skylark, Utah.....	July 10	July 27	0.005
West'n Mines Co., N.....	Aug. 1	Aug. 31	0.02
Zeibright, Cal.....	July 15	Aug. 6	0.05

Monthly Average Prices of Metals

AVERAGE PRICE OF SILVER

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January.....	65,288	68,673	30,113	31,769
February.....	66,108	68,835	30,464	31,852
March.....	64,597	67,519	29,854	31,325
April.....	64,765	65,462	29,984	30,253
May.....	66,976	65,981	30,968	30,471
June.....	65,394	67,090	30,185	30,893
July.....	65,105	...	30,113	...
August.....	65,949	...	30,529	...
September.....	67,927	...	31,483	...
October.....	69,523	...	32,148	...
November.....	70,813	...	32,671	...
December.....	69,050	...	32,003	...
Year.....	66,791	...	30,868	...

New York, cents per fine ounce; London, pence per standard ounce.

AVERAGE PRICES OF COPPER

Month.	NEW YORK.		LONDON.	
	Electrolytic	Lake.	1906.	1907.
January.....	18,310	24,404	18,419	24,825
February.....	17,869	24,869	18,116	25,236
March.....	18,361	25,065	18,641	25,560
April.....	18,375	24,224	18,688	25,260
May.....	18,475	24,048	18,724	25,072
June.....	18,442	22,665	18,719	24,140
July.....	18,190	...	18,585	...
August.....	18,380	...	18,706	...
September.....	19,033	...	19,328	...
October.....	21,203	...	21,722	...
November.....	21,833	...	22,398	...
December.....	22,885	...	23,350	...
Year.....	19,278	...	19,616	...

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

AVERAGE PRICE OF TIN AT NEW YORK

Month.	1906.	1907.	Month.	1906.	1907.
January.....	36,390	41,548	July.....	37,275	...
February.....	36,403	42,102	August.....	40,606	...
March.....	36,662	41,313	September.....	40,516	...
April.....	38,900	40,938	October.....	42,852	...
May.....	43,313	43,149	November.....	42,906	...
June.....	39,260	42,120	December.....	42,750	...
			Av. year.....	39,819	...

Prices are in cents per pound.

AVERAGE PRICE OF LEAD

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January.....	5,600	6,000	16,850	19,828
February.....	5,464	6,000	16,031	19,531
March.....	5,350	6,000	15,922	19,703
April.....	5,404	6,000	15,959	19,975
May.....	5,685	6,000		