

# The Engineering and Mining Journal

VOL. LXXXII.

NEW YORK, SEPTEMBER 8, 1906.

NO. 10

Published Weekly at

505 PEARL STREET, NEW YORK

London Office: 20 Bucklersbury, London E. C., Eng.

CABLE ADDRESS "ENGINJOUR, N. Y."

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

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

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

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

Copies are on sale at the news-stands of the following hotels:—Waldorf-Astoria, New York; Brown Palace, Denver; and the leading hotels in the principal cities.

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THE ENGINEERING AND MINING JOURNAL.

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

During 1905 THE ENGINEERING & MINING JOURNAL printed and circulated 454,250 copies, an average of 8735 per issue. Of this issue 8000 copies are printed. None sent regularly free. No back numbers beyond current year.

## Madagascar Mining.

BY M. S. STUTCHBURY.

In June, 1905, the mining community in Madagascar was much upset by an official order that no further prospecting on free lands was to be allowed. The Government books for the registering of pegs was closed, and prospectors were at a loss to know what to do. Various rumors were rife at the time, some to the effect that the French Government had sold all the gold rights on ground not taken up to a syndicate; others that the Government itself was going to work gold. However, owing to the number of legitimate complaints made to headquarters, pointing out the hardship that such a decree put upon independent prospectors, on June 23, 1905, a new *arrête* was passed, allowing ground to be prospected and pegged, such pegging to give right of priority in taking up the ground under the conditions of the new law when it came out. This has at last been published in the island; it was published in France last November and was brought out to Madagascar by the new governor general.

On its unofficial publication in the island it met with such opposition, that a petition was made asking the governor not to publish the law with certain modifications. The matter has evidently received some attention, there being an interval of three months between its publication in France and Madagascar, but no notice has been taken of the prospectors' petition.

The distinction, as in the old law, between a *permis de recherche* and a *permis*

*d'exploitation*, or in other words a prospector's and digger's license, is still maintained. Under the new law the planting of a peg and the payment of 25 francs gives the prospector sole right to prospect the ground to the exclusion of others within 1 km. radius of the said peg for one year. Should a renewal of this permit be required at the end of the first year it can be obtained on the payment of 100 francs, and for a third year a sum of 250 francs is demanded. In addition to this, 10 per cent. of the value of the gold extracted is taken by the State.

At any time during this period the *permis de recherche* can be changed into a *permis d'exploitation*. To do this one has to furnish a complete plan of the neighborhood of the peg and marked thereon a rectangle or square showing the ground required. The area of this is subjected to an annual tax of 2 francs per hectare, and the gold extracted therefrom is subjected to 5 per cent. *ad valorem* tax with a minimum of 65 francs per quarter. This is for alluvial ground.

For reef ground similar conditions prevail with regard to pegging and the *permis de recherche* is granted as in the case of alluvial; when this permit, however, is changed for the *permis d'exploitation*, a tax of 100 francs per hectare per annum is charged for the surface of reefs, properly so called, and the rest of the ground pays 2 francs per hectare per annum.

In addition there is the 5 per cent. *ad valorem* tax for all gold extracted, and an additional tax of 5 per cent. on the output when it exceeds 250,000 francs per annum in value. At the same time it is stated that, on application to the governor general, certain modifications may be accorded relative to this last imposition where it can be shown that owing to installation expenses, etc., no profits have been made, notwithstanding such a production. In all cases taxes are paid in advance and a careful register of gold extracted has to be kept showing names of workers, number of days worked, quantity of gold obtained and cost of so doing.

No gold is allowed to leave the concession without a *laissez-passer*. Perforated books of these have to be obtained, signed and numbered by the commissaire of mines for each exploitation being worked. A licensed gold buyer (who has to pay 1800 francs for his license) will not take gold unless accompanied by a *laissez-passer*. Natives are not allowed to work gold on their own account.

It will thus be seen that as regards alluvial ground the new law is not unreasonable, but there is injustice inasmuch as the law goes on to say that holders of

permits *already granted* under the old law are to enjoy their privileges only until 1908, when they will come under the terms of the new. The clause requiring this has been much criticized and is thought to be illegal. The prospectors and miners on the island are now doing all they can to have it altered.

It is said that the Government already regrets its hasty action in annulling the law of 1902, which was very reasonable and suited everybody. They did so on the spur of the moment when it was thought that, owing to the 100-franc shares of a certain company booming up to 1400 francs, the island was much richer than had been previously supposed, and that the Government should partake in some of the fortunes which seemed likely to be made. It was, however, only a boom and things have now returned to their normal condition. There is gold in Madagascar, but the best methods of working it have not yet been discovered. It is thought that the future prosperity of the gold industry rests in dredging, but, owing to lack of capital, only one machine has been built, and this, it is understood, has been a failure, owing probably to wrong design and insufficient preliminary prospecting.

## Use of Calcium in Metal Refining.

In former experiments made with a view to refine copper, bronze, steel, pig iron, etc., by the aid of metallic calcium, the results were unsuccessful because the calcium was volatilized immediately after being placed in the metal, or burnt on the surface. The process recently invented by Brandenburg and Weins employs the calcium in form of turnings, instead of large lumps, and mixed with turnings or small fragments of one or more metals. This mixture of various metals in a solid form, e.g., a brick, is placed in the liquid metal. To refine the latter at a high temperature, the calcium turnings are mixed with those of metals more difficult to fuse than calcium. Thus copper or copper alloy can be refined by mixing calcium, copper and bronze turnings, and molten iron or steel with calcium, iron and steel turnings. Metals can also be refined at temperature of fusion of calcium or lower, the calcium turnings being mixed with those of a more fusible metal, and the cakes or bricks formed from the mixture made to react. Cast iron, already rather pasty, can be refined by employing, for example, calcium and aluminum turnings. The process was described in *Revue des Produits Chimiques*, Aug. 1, 1906.

## The Utah Copper Company's Mine and Mills.

STAFF CORRESPONDENCE.

This company was one of the first to take hold of the disseminated copper ore in Bingham Cañon, Utah, and it is one of the few companies in the West using the caving system of mining. The first work was done upon this property many years ago, but not much was accomplished un-

til Colonel E. A. Wall acquired it. He did some prospecting and then succeeded in interesting Captain J. R. De La Mar. They drove some short tunnels through the capping, into the orebodies, and also did some work on veins that occur in the property. However, Captain De La Mar soon withdrew, on the advice of his engineer, who did not think that these low-grade ores would prove of much value. At the same time the Boston Consolidated did some work on its low-grade porphyry ore. Colonel Wall was laughed at because he stuck to the property and predicted that some day it would become one of the largest copper mines in Utah, and to him is due especially the credit for first recognizing the value of the disseminated ores of this camp, which will doubtless yield far more copper than its mines on other types of ore deposits. In 1903 Colonel Wall succeeded in convincing the people who afterward organized the Utah Copper Company that these orebodies were valuable and sold the mine to them, receiving a certain amount of shares in the new company, the bulk of which he still retains.

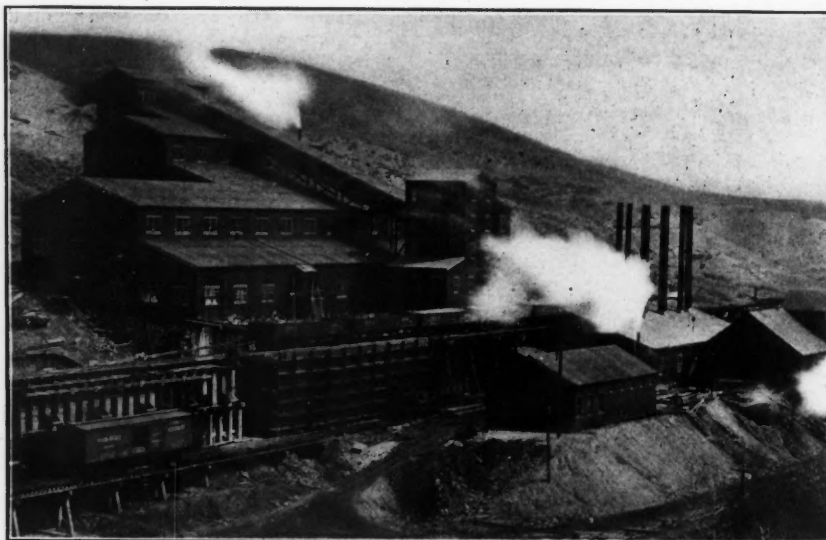
### THE OREBODY.

The Utah Copper Company's deposit consists of an immense laccolith of porphyritic monzonite which has been intruded into the mass of Bingham quartzite. This mass of porphyry has been much fractured and broken. The mineral value is in the chalcocite and bornite. There is a little chalcopyrite present in the ore, but it is not sufficient to give any band on the

Wilfley tables at the mill. The mineralization seems to be very uniform throughout the orebody, wherever it has not been leached. There is a surface capping of the orebody consisting of leached porphyry which has considerable green copper carbonate along its fracture planes, but the

### MINING SYSTEM.

The Utah Copper Company is at present



UTAH COPPER CO.'S MILL.

mining this immense deposit by a caving system, which will be retained to mine the orebody where the capping may be too thick to pay for stripping the deposit and using steam shovels or the milling method. The object of the caving now being car-

ried on near the surface is to break up the ground so that a steam shovel can handle it. The leached capping of the orebody will be stripped off by steam shovels. Part of the stripped ore will then be mined by the steam shovels and part by the mill-hole method. The company intends soon to begin to use the steam shovels. Two Marion and one Vulcan steam shovel will be used at first.

The upper part of the ore deposit has been cut by the Bingham cañon, forming an east section and a west section. That on the east side has been opened up by a series of nine sub-levels; that on the west by ten sub-levels. Each of these sub-levels connects by adit to the surface, so that, owing to the numerous raises from one level to another, a very good ventilation is obtained. On the lowest level a system of haulage ways has been laid out. A horse-shoe shaped double-tracked main haulage way runs into the orebody on one side of the cañon, swings around and comes out in the ore on the other side of the cañon.

The deposit on both sides of the cañon has been opened up and mined in a very similar manner, so that what is said of one holds good in a general way for the other. Therefore, the manner of working the western part only will be described.

At intervals of 150 ft. along the main haulage way, side drifts (about 8x7 ft. in the clear) have been run off toward the east and west. The west drifts are placed staggered with the east in order to facilitate putting in the switches. Five of these east drives and four of the west ones have been run. From the easts and wests have been driven at intervals of 75 ft. a series of south drifts. In places

along the first south drift, on either side of the main haulage way, a series of easts and wests has been driven between the main easts and wests so that the level is blocked out into a series of pillars 75 ft. square. On the east side of the main



UTAH COPPER CO.'S MINE.



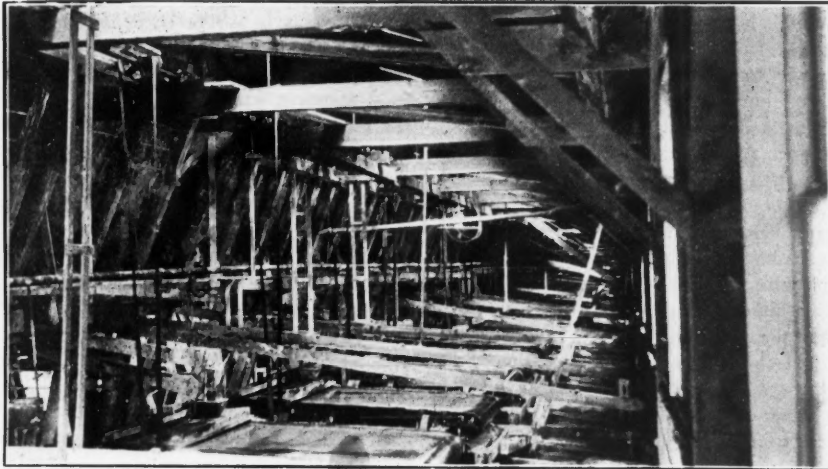
haulage way there are six of these south drifts, while on the west side there are four. All of these drifts have been run 8x7 ft. in the clear, so that the trolley trains can go into any of them and load from the chutes. Electric haulage is used to take the ore out to the bin along the railroad track. These bins hold about 700 tons. Five-ton electric locomotives are used to haul trains of six side-dumping cars, which hold about 2½ tons apiece.

in adjacent pillars at the same time. After the stope is caved the ore is shoveled out by working under the protection of the overhanging part of the pillar. The ore in the center of the caved stope is obtained by putting up a series of mill-holes under the center of the caved pile and drawing it through them to the cars on the level below. Owing to the fractured nature of the porphyry this caved ore is broken quite small and little trou-

used in undercutting the pillars and in drawing the raises, while a few 3¼-in. machines are used in driving some of the headings in hard rock. Wheelbarrows are used on the upper levels in the region where caving is being done, because it is cheaper to employ them when there is only a run up to 75 ft. in length than to put in a system of tracks, turn sheets, etc., and shovel the ore into cars. The parts of the pillars to be blasted last are drilled beforehand, so that the stubs of the pillars can be blasted whenever desired to cave the stope.

The ground in the drifts stands well and very little timbering is required upon any of the levels. The sub-level interval was at first 17 ft., but now this interval is 25 ft. Formerly the raises in the center were put up after the stope had caved; now they are being put up before the cave occurs.

At present the company is working six 3¼-in. and fourteen 2¼-in. drills. These are mostly Ingersoll-Sergeant drills, but there are some Sullivans. A Numa drill sharpener is used. Two men sharpen and temper about 300 drills a day with this, besides doing the ordinary repair work necessary to be done by blacksmiths about such a mine. The drills are heated in a regular blast forge and are sharpened in the drill-sharpener. They are then allowed to cool. After all have been sharpened they are treated in an ordinary forge, only as small a part of the bit as possible being heated to cherry red. The bit is then plunged and the temper drawn. Then, when the temper has been drawn enough, the bit is plunged again and placed aside while still quite hot. No



VANNER ROOM.

The track has a 24-in. gage, and 30-lb. rails are used.

Blind raises, or rather mill-holes, are put up to the sub-levels above at intervals of 75 ft. along the easts, wests and souths, but there is none along the main haulage way. On the sub-level below the one on which most of the caving is being done, a system of 18-in. tracks has been put in. Raises are up at intervals of 25 ft. to the level above. In the parts of the sub-levels where caving is being done, the orebody is divided up by a series of east and west and north and south drifts into blocks 50 ft. square.

The capping of leached porphyry follows the contour of the surface. Caving is begun by under-cutting the blocks nearest this capping by a series of drifts. A stope is opened out and the ore is shoveled into wheelbarrows and run to the raises leading to the sub-level below, where the ore is drawn into cars and run to the mill-holes leading to the main haulage level. The stope is enlarged by cutting away the side of the pillars parallel with the capping. This is done by a series of undercuts driven along the face of the pillar, the machine being set up under the overhanging pillar and the ground being broken by "sidewinders" 6 or 7 ft. deep. After this undercut has been taken out across the face of the pillar, the machine works back toward the drift again, drilling and blasting a series of uppers in the overhang of the pillar. Then another undercut is driven and the process repeated until enough ground is opened up to cause a cave. Of course this is being carried on

ble is experienced by boulders blocking the mill-holes. If such occurs, a stick of powder held against the boulder by a plaster of clay will break the boulder to pieces when it is fired. In case the block should occur high up in the mill-hole, a stick of powder on a long pole does the work.

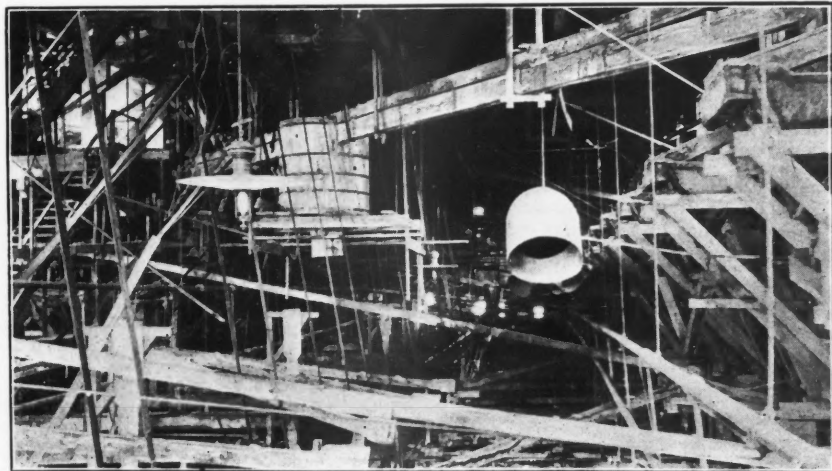


TABLE ROOM AND SETTLING TANKS.

Caving is done on several of the sub-levels at the same time, care being taken that the caving in the lower levels is not being done under where men are working above. The stope is worked until the amount of leached capping mixed with the ore becomes too great. The percentage of the ore recovered at this mine by the caving system is not known.

"Chippie," i.e., 2¼-in. machines, are

trouble is experienced with broken bits. The drills only lose their gage. That is the reason that two men can do the sharpening and blacksmith work for the two shifts in the mine.

Dynamite of 30 per cent. grade is used in breaking the ore. The company works 165 men on both shifts, including the men underground and at surface. Compressed air is bought from the United States Min-

ing Company, electricity from the Telluride Power Company. Current of 500 volts is used on the trolley circuit. The compressed air is at about 80 lb. per sq. in. The wages of machinemen are \$3 per 8 hours; muckers, \$2.50; trammers, \$2.50; timbermen, \$3@3.50. The ore from the



SHOWING CAVING OF SURFACE.

bins is drawn into side-dumping railroad cars and taken by the Copper Belt Railroad to the company's mill about 2½ miles farther down the cañon.

#### METHOD OF MILLING.

In treating these ores fine reduction is absolutely necessary to release the mineral particles. The method of effecting this fine crushing is a matter of great importance and much study has been devoted to it by the men in charge of both the Utah Copper Company and the Boston Consolidated. The Boston Consolidated erected a small stamp mill with tables and vanners and after many experiments decided to use the Nissen stamp in its 3000-ton plant. The Utah Copper Company, basing its decision upon the experience gained in treating the ore in the mill to be described herein, is going to use in its 6000-ton plant, which is being erected near Garfield beach, gyratory crushers and rolls for the preliminary crushing and Chilean mills for the final grinding of the ore.

The Utah Copper Company's first mill is situated about a mile and a half below Bingham at Copperton station on the Bingham branch of the Rio Grande Railroad. This mill is of the side-hill type, there being three main terraces, viz., the roll floor, the table and vanner floor, and the lower vanner and crusher floor. The

ore from the mine is brought by the Copper Belt Railroad in side-dumping cars to the 1000-ton ore bin placed at the bottom of the mill. This bin feeds through a movable hopper placed under the chutes to a belt conveyor which takes the ore up a short incline to a grizzly having 1-in. openings.

The undersize from the grizzlies goes to a belt elevator, while the oversize goes to a No. 7½ Gates crusher and then rejoins the undersize from the grizzly and is raised by a 16-in. belt elevator to a trommel having 1¼-in. openings. The oversize from this trommel goes back by a chute to a No. 4 Gates crusher, and after being crushed, goes to the No. 1 elevator. The undersize from the trommel goes to another 16-in. elevator which raises it to a conveying belt which takes it up an incline of about 22 deg. This conveying belt feeds the ore to two inclined screens having ¾-in. openings and a ¼-in. steel wire. These screens are provided with a bumping motion, but it is used only when the ore is wet. The screens are pivoted at the upper end and at the lower end there is a rotating cam which gives the screen a downward jar. Some trouble is experienced from the screen blinding.

Beginning with these inclined screens the mill is built in two units. In the rest of the article only one unit will be described as they are practically duplicates of each other.

The undersize from the inclined screens goes to a middle bin holding about 250 tons. The oversize goes to a 250-ton bin placed on each side of the middle bin. The middle bin discharges by means of a plunger feed to chutes leading to belt elevators. This fine ore feed can be split so that half goes to each unit or else it can all be sent to either side to balance any inequality in the amount of coarse feed going to either unit. The coarse bins each feed, by means of a plunger, to a 36x15-in. belted Gates rolls, where water is first added.

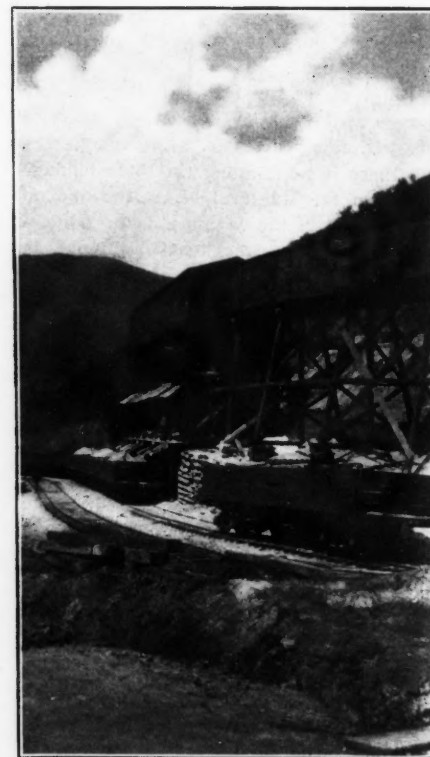
The crushed ore joins the split undersize and goes to a 16-in. elevator, which is not housed in, wherefore there is ready access to it in case of choking up, as sometimes happens. The elevator pit is simply a hole hollowed out in the foundation of the mill. The elevator in each unit takes the wet ore to a double series of two revolving trommels, which have slotted-wire screens. As a jet of water is kept playing on them, only an occasional beating with a piece of belting is necessary to keep them entirely free from blinding. The oversize from the first two trommels (which have a 0.09-in. opening) goes back to the fine rolls and, after being re-crushed, rejoins the feed to the main elevator. The undersize goes to the two other trommels (0.021-in. openings), and the oversize from these goes to three 6-ft. Chilean mills, while the undersize goes to a three-cone classifier.

The size of screen opening on these

Chilean mills is 0.015 in. The pulp of this size joins the undersize from the last trommel and goes to the three-cone classifier. The product from the first cone goes to three-compartment Harz jigs, having screens of the same size as on the Chilean mills. These hutch concentrates from the jigs then go to Wilfley tables for final cleaning. The second and third cones feed to Wilfley tables. The company contemplates the substitution of vanners for most of the Wilfley tables.

The light tails from the Wilfley tables go to the creek, while the heavy tails, together with the slime water coming off the tables and the jig tails, are returned to a cylindrical classifier by means of a centrifugal pump. The sands from this classifier go to the Chilean mills, while the overflow, together with the overflow from the cone classifiers, goes to two units of 12 settling tanks each. These settling tanks each have a small pyramidal classifier built in front of them. The pulp goes first to these small classifiers and then overflows into the V-shaped settling tanks. Three of these small classifiers feed one Wilfley table.

The settling tanks are sometimes built double and placed side by side so that one overflows into the other. The double



ORE BINS AT MINE.

boxes are 9½ ft. long, 5 ft. wide and 6 ft. deep. The single boxes are 9½ ft. long, 10 ft. wide and 6 ft. deep. Two gate valves are placed in the bottom of each tank to draw off the settled pulp. Each tank has a separate feed, which comes from the small classifier to a distributing box placed along one of the sides of the



V. This flows against a baffle plate, which extends about 2 ft. below the surface of the water; this forces the pulp to flow into the tank below the surface. The overflow water from these tanks is quite clear and is used on the tables and vanners for wash water. The tanks are made of 2-in. plank and are held together by tie rods. The large single tanks seem to be the best, for they give as clear an overflow as do the others, and also allow of easier access to the plugs at the bottom, so that the feed to the vanners can be shut off quickly and easily in case of a shutdown.

The pulp from the 12 settlers is treated upon 15 Frue vanners on the upper floor and 12 on the lower. The tails from the vanners go to the creek, while the concentrates are washed by means of a hose into launders, which take them to the concentrate bins. Smooth belts, pebble belts, corrugated belts and canvas belts are used on the vanners, which are all 6 ft. wide. The corrugated belts are preferred for the coarse vanner feed, as they seem to make a better saving and also to give the vanners a slightly larger capacity, while smooth belts are preferred for the fine vanner feed.

There are three Card and two Overstrom tables used in the mill and 37 Wilfleys.

The table concentrates are taken by a shaking conveyor to launders, which deliver them to the concentrate bin. The excess water from the settling tanks goes to a pond and is returned to the mill by plunger pumps.

The heads and tails from all the tables and vanners are sampled by a man who runs a cup under each product of the tables and vanners. As soon as he has made one trip he begins another. The pulp from the Chilean mills is sampled for a screen test each day, which keeps track of the watchfulness of the millmen in replacing broken screens, etc. A general tailing sample is taken by a mechanical device in the main tail race.

This mill was built three years ago. It has a capacity of 800 tons in 24 hours. The coarse crushing department is run two 8-hour shifts, while the rest of the mill, including the rolls, Chilean mills and concentrating part, is run three 8-hour shifts. The power plant comprises ten 80-h.p. boilers (equipped with American stokers), of which two are generally in reserve, and a 550-h.p. Twin City Corliss engine. The crude ore averages 2 per cent. copper. The concentrates average 30 per cent. A 550-h.p. Twin City Corliss engine, having a fly-wheel 20 ft. diameter, runs the mill. A 50-h.p. Ideal engine runs the crushing department.

An alloy of 60 parts copper, one part tin and 39 parts of zinc, is found to offer great resistance to the action of sea water, and has been largely used in naval construction.

### Notes on Western Australia Mines.

BY W. BURRELL.\*

A new field appears likely to be added to the auriferous and mineral resources of this State by the new finds on the West Kimberley at the north of Western Australia. Lone prospectors sent out by Melbourne and Adelaide capitalists have made important discoveries, though reports are at present conflicting and not sufficiently reliable to form definite ideas as to values. A number of local syndicates are also sending prospectors.

At Narlarla Hills, ore assaying high in gold, silver and lead has been opened up and has recalled the boom times of Broken Hill. At another point, copper ore outcropping for a considerable distance, and showing great widths in some places, has been tested, and shows high copper. Allowing somewhat for distance and enthusiasm, still there can be no doubt that a great prospect awaits development. The Government has lost no time in sending one of its geologists to make reports and surveys, so we shall soon have some official evidence to go upon.

Another great mineral area, the Pilbarra, near the northwest coast, is also attracting renewed attention with the near prospect of a railway. The possibilities of this field are great; a number of mines are partially developed, and many known deposits of gold, tin, copper, etc., await only better transport.

On the older Murchison fields, the Black Range, a new district, about 100 miles south of Mt. Magnet, is opening up remarkably well. The Sandstone leases have recently been purchased by the Oroya-Brownhill Company, after extensive development work during their option. Many owners of leases are doing well. The reefs are mostly of a fair size and of good values. A branch line of railway is shortly to be made. The Great Fingall Consolidated continues its wonderful career, and appears to be opening up bottom levels satisfactorily. The June output was 20,785 tons, yielding 10,606 oz. gold.

At Kalgoorlie the Great Boulder Proprietary has recently struck a body of ore at the 1900-ft. level, about 28 ft. thick and carrying 11 dwt. per ton. The plant designed to treat the accumulated tailings is nearly completed. The success of this process will be an important matter to the district.

In the Golden Horseshoe, the No. 3 lode, cut at the 1300-ft. level, has widened out to 15 ft. and averages 25 dwt. per ton. At the Ivanhoe, the body of ore recently cut at the 1373-ft. level is opening up well, and generally the mine looks satisfactory.

In the Kalgurli, the eastern orebody at the 1150-ft. level averages 14 dwt. per ton, for the full width of 30 ft. The

western orebody at the same level is worth 12 dwt. per ton, and shows tellurides in the face.

The Boulder Perseverance has started its new sulphide-treatment plant. The roasting facilities are much improved and all is working smoothly. This plant will treat about 16,000 tons per month, and costs will be reduced to a little under 19s. per ton. The mine is opening up satisfactorily, and, treated now as a big low-grade mine, should earn between £10,000 and £11,000 per month profit. In the Hainault, 750-ft. level, ore worth 12 dwt. per ton over a width of 30 ft. is being broken. The enlargement of the treatment plant is being carried out. Rich ore is still being obtained at the north end of the belt, in the Hidden Secret, and deeper development is being pushed.

At Laverton, the Lancefield has resumed active development in readiness for the new sulphide plant, which will soon be started. The Augusta mine continues to yield splendid returns to the small local syndicate which purchased it for a small sum when abandoned by the old London company. Since taking it over, the present owners have crushed 2190 tons for a return of 4262 oz. gold, worth £17,000, of which £11,000 is estimated to be profit. The old British Flag mine has been restarted by a local syndicate, and has crushed, as a test parcel, 14 tons for a yield of 68 oz. Very rich patches were formerly obtained from this mine.

The Phillips River gold and copper field has attracted much attention. The Government has sold the State smelter to the Kaufman syndicate, and will shortly call for tenders for a railway to the coast.

### Lead Peroxide Manufacture.

L. Friderich, E. Mallet and P. A. Guye, in *Monit. Scient.*, 1906, XX, pp. 514-518, state that normal or basic lead sulphate can be converted into lead peroxide with a nearly theoretical yield, by mixing it with magnesia, suspending the mixture in water, and passing in chlorine. In a trial with 5 kg. of lead sulphate in a rotating barrel of 25 liters capacity, the operation was completed in about three hours, and required: Water, 13 liters; magnesia, 1.2 kg.; and chlorine, 1.2 kg. The crude reaction product obtained contains at least 90 per cent. of lead peroxide, and by purification first with caustic soda, and then with acid, a product of 97 per cent. purity can be obtained, containing only traces of chlorine. The cost of production of 100 kg. of lead peroxide is given as follows: 36 kg. of magnesia at 7 francs per 100 kg., 2.50; 3 kg. of chlorine at 15 francs per 100 kg., 4.95; 146 kg. of lead sulphate at 23 francs per 100 kg., 33.60; labor, etc., 3; total 44.05 francs.

Up to Aug. 11, of the Chinese on the Rand only 570 had applied to be repatriated, 200 under the first notice, and 370 under the second.

\*Mining engineer, Perth, W. A.

### Drilling Practice in the Lake Superior Copper Mines.

BY W. R. CRANE.\*

The practice of drilling in the Lake Superior copper mines does not differ materially from that of other large districts, and there cannot, in fact, be much difference in the use of the same appliance except as the operations are affected by local conditions, such as character and state of formations, occurrence of much or little water, and occasionally the presence of gases. Occasionally the introduction of a new or improved drilling mechanism into a district is responsible for a variation in practice, which is, however, only temporary if the innovation proves of positive value.

The standard forms of machine drills, such as the Ingersoll-Sergeant, the Rand, etc., are employed, with which are used the ordinary straight-edged and cross-bits. A new form of bit has, however, been in use, for some time, at several of the mines, especially the Mohawk and Wolverine, and has proved to be a decided success. Two views of this bit are shown in Fig. 1. The bit has been named "Mohawk" after the mine in which it was first used. It is employed in the whole operation of drilling, i.e., from the start to the finish of a hole, although the straight-edged bit is occasionally employed as an alternate to straighten a hole.

The special advantage claimed for this bit is that there is less danger of it slipping to one side, and so binding or becoming fitchered, and the projecting central portion, being driven on in advance, acts as a centering device, thus holding the body of the bit to its course.

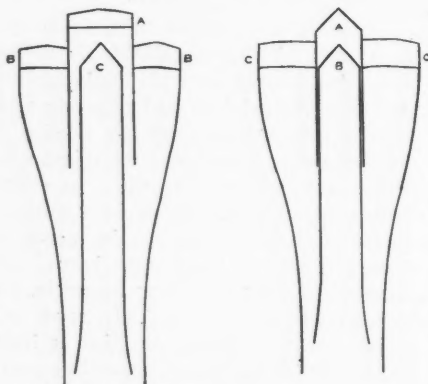


FIG. 1. THE MOHAWK BIT.

Aside from the advanced cutting edge, the bit is simply the old cross form, and has been developed from, or, at least, corresponds to the stepped forms of well-drilling bits used in Europe.

Although there is no doubt that this new form of bit is of considerable assistance in preventing the fitchering of drills, yet there are conditions and occurrences of rock where no form of bit

would avail much in keeping a hole straight, in which case the usual practice of employing scrap iron, or rather, in this case, pieces of native copper broken from

drills are operated on an air pressure of 70 to 80 lb.

All work is done by machine drills and as the mining operations (aside from shaft sinking) resolve themselves into drifting and stoping, it is usual to speak of drilling as drift and stope drilling—the latter is, however, for convenience, sub-divided into

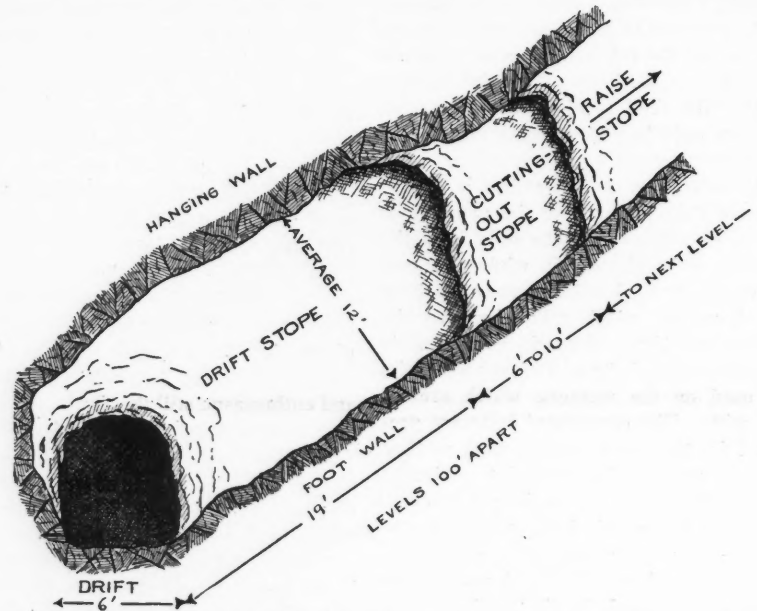


FIG. 2. KIND AND ARRANGEMENT OF DRIFT AND STOPES.

the rock, is resorted to and usually proves very effective.

At the Wolverine mine, Rand drills are used, the standard size being 3 in.; they are, however, turned, as worn, to 3 1/16, 3 1/8, and 3 3/16 in. with pistons to fit. They are mounted on both columns and tripods, usually the former, although tripods are, in rare instances, employed in large stopes, where the work of drilling has more the nature of quarrying. The

drift-stope, cutting-out-stope, and raise-stope drilling. The arrangement of drifts and the different forms of stopes, as seen in section, are shown in Fig. 2. The drilling practice at the Wolverine mine is given in Table I.

There is comparatively little drifting done in the copper mines, except when crosscuts are driven connecting different lodes, and occasionally on the levels where barren rock is encountered. Some details

TABLE I.

	Depth of Holes in Feet.	Kind of Holes.	Total Time of Drilling per Hole.	Delays in Drilling per Hole.	Actual Time of Drilling per Hole.	Number of Sticks of Powder per Hole.
Drifting. (Average of 10 holes)	5.76	Dry.	52' 23"	13' 00"	36' 44"	4.6
Drift Stopping. (Average of 9 holes)	5.60	Dry.	41' 47"	19' 29"	24' 4"	5.6
Cutting-Out Stopping. (Average of 6 holes)	7.50	Wet and Dry.	48' 40"	28' 10"	39' 54"	5.2
Raise Stopping. (Average of 9 holes)	6.50	Wet and Dry.	52' 12"	11' 12"	51' 6"	6.1

TABLE II.

Number of Hole.	Total Time of Drilling per Hole.	Delays.	Actual Time of Drilling per Hole.	Depth of Hole.	Remarks.	Number of Bits Used per Hole.
1	31 min.	5 min.	26 min.	5 1/2 ft.	Wet.	4
2	32 min.	5 min.	27 min.	5 1/2 ft.	Wet.	4
3	37 min.	7 min.	30 min.	5 1/2 ft.	Dry.	4
4	38 min.	7 min.	31 min.	5 1/2 ft.	Dry.	4
5	148 min.	48 min.	100 min.	5 ft.	Dry.	3
6	50 min.	10 min.	40 min.	6 ft.	Dry.	4

\*Assistant professor of mining, School of Mines, Columbia University, New York City.



of drilling in drifts, showing considerable variations, are given in Table II.

Drift stoping consists in carrying both a drift and a portion of a stope together, the total width being 25 ft.; 6 ft. of which are considered as drift, the remaining 19 ft. as stope. Occasionally stoping is begun after a drift has been run, which opera-

is removed from the vein between levels, with the exception of pillars left for support of the hanging wall. Rates of drilling under these conditions are given in Table IV.

Raise stoping consists in driving from 15 to 20 ft. width of stope directly up the pitch of the vein to the level above. Raise

**Electric Steel Making in Germany.**

At the works of Richard Lindenberg, at Remscheid, the Héroult method is in use. The plant consists of a 2-ton Wellman open-hearth furnace, in which the raw material, principally scrap, is melted down, and the process is so constructed that the steel is overoxidized. The steel is then transferred to the Héroult furnace. The quantity charged is about two tons, and the steel is purified in the electric furnace by the addition of scale or ore, the impurities in the metal, like silicon, carbon, manganese and phosphorus, being oxidized. The slag is poured off by tilting the furnace. Then a neutral slag is formed in the furnace by additions of lime and sand, under which deoxidation is carried on by means of carbon.

Manganese, tungsten or other additions to the steel may be made to it by adding to the covering slag oxides of manganese or tungstic acid; practically all of the manganese thus added is recovered in the steel. The yield of steel is high, being on an average 92½ per cent. in the form of hammered blooms, while the slag is white and practically free from iron. The phosphorus contents of the steel have averaged 0.005 and of sulphur 0.012 per cent. The charge requires from 2 to 2½ hours irrespective of the size of the furnace.

At Remscheid, with a 2-ton furnace, the cost of the steel can be brought down to 120 marks, and it is estimated that with a 10-ton furnace it can be brought down to 90 marks per ton. With a 2-ton furnace the requirement of electric power is 360 kw. per ton of steel, and it is estimated that with a 10-ton furnace this will be reduced to 150 kw.

**Soft Graphite Made Electrically.**

Edward G. Acheson, of Niagara Falls, N. Y., has announced that he has discovered a process for making unctuous or soft graphite. Heretofore, the graphite made by the International Acheson Company has been hard graphite, and has been applied to a field not entered by the natural graphites, such as in the manufacture of electrodes, as a battery filler, and as a paint pigment. The soft graphite will be used as a lubricant, as a stove polish and also for coating gunpowder, which is tumbled in graphite to coat or face it. It will also be used for electrotyping.

As it can be manufactured at comparatively low cost, it is expected that the new, soft graphite will become a successful competitor of natural graphite. The product of the experimental furnaces has been very satisfactory as to uniformity. Mr. Acheson predicts that within a few years the manufacture of artificial graphite will be the largest industry at Niagara Falls.

TABLE III.

OPERATION.	1	2	3	SIZE OF BITS.
Setting drill.....	3' 45"	21' 00"	5' 50"	2¼ in.
Drilling.....	9 45	8 20	21 10	2¼ in.
Changing bit.....	34 00	55 00	4 00	2¼ in.
Drilling.....	8 2½	4 25	12 00	2¼ in.
Changing bit.....	0 48	1 00	1 15	2 in.
Drilling.....	7 11	7 55	1 00	2 in.
Changing bit.....	0 59	0 40	3 00	1½ in.
Drilling.....	8 27	15 30	9 45	1½ in.
Changing bit.....	2 43	4 30	.. ..	1½ in.
Drilling.....	8 7	6 00	.. ..	1½ in.
Delay.....	.. ..	0 45	.. ..	1½ in.
Drilling.....	.. ..	7 35	.. ..	1½ in.
Total time .....	84 15	132 40	58 00	
Actual time.....	41 56	48 5	43 55	
Delays.....	39 15	82 55	14 5	
Depth of hole.....	9 ft.	9½ ft.	5½ ft.	
Kind of hole.....	Wet.	Wet.	Dry.	

TABLE IV.

Number of Hole.	Time Required to Drill 1 ft. of Hole.	Depth of Hole.	Number of Bits Used per Hole.
1	4.33 min.	6 ft.	4
2	7.2 min.	6 ft.	4
3	2.7 min.	10 ft.	5
4	8.0 min.	6 ft.	4
5	8.23 min.	5 ft.	3
6	7.60 min.	7 ft.	4

stopes are driven at the boundaries of properties, also to form connecting passages between levels, for air- and man-ways, and to form pillars. In certain mines they are regularly driven 300 ft. apart, thus forming the so-called dead-ends, or long rectangular pillars, running transversely with the stopes. Data regarding raise stoping are given in Table V.

Interesting and valuable information can be obtained from a detailed study of such data, but it is evident from the above

TABLE V.

Number of Hole.	Total Time of Drilling.	Delays.	Actual Time of Drilling.	Depth of Hole.	Remarks.	Number of Bits Used per Hole.
1	46 Min.	8 Min.	38 Min.	7½ Ft.	Dry.	4
2	54	9	45	7½	Dry.	4
3	64	7	57	6¾	Wet.	4
4	115	28	87	7	Wet.	4
5	45	8	38	8	Wet.	5

tion is then cutting-out-stoping. Data taken from observations on three holes in drift stoping are given in Table III.

Cutting-out stopes may begin at a drift, as mentioned above, but as a usual thing the term is applied to the work of stoping by cutting off portions, of more or less definite thickness, successively from the face of a stope, beginning with and proceeding upward from a drift or drift-stope face. It may be considered as stoping proper, as it comprises the greater part of the stoping operations by which the ore

that fine distinctions and differences can be made only through averaging a large number of observations. Variations in kind and conditions of rock, distance between foot and hanging walls, and last, but not least, the personal equation of the drill operators, all have much to do with the amount and character of work done. However, the above data were taken from points considerably distant apart and from drill crews of varying degrees of skill. The results should, therefore, be fairly representative.

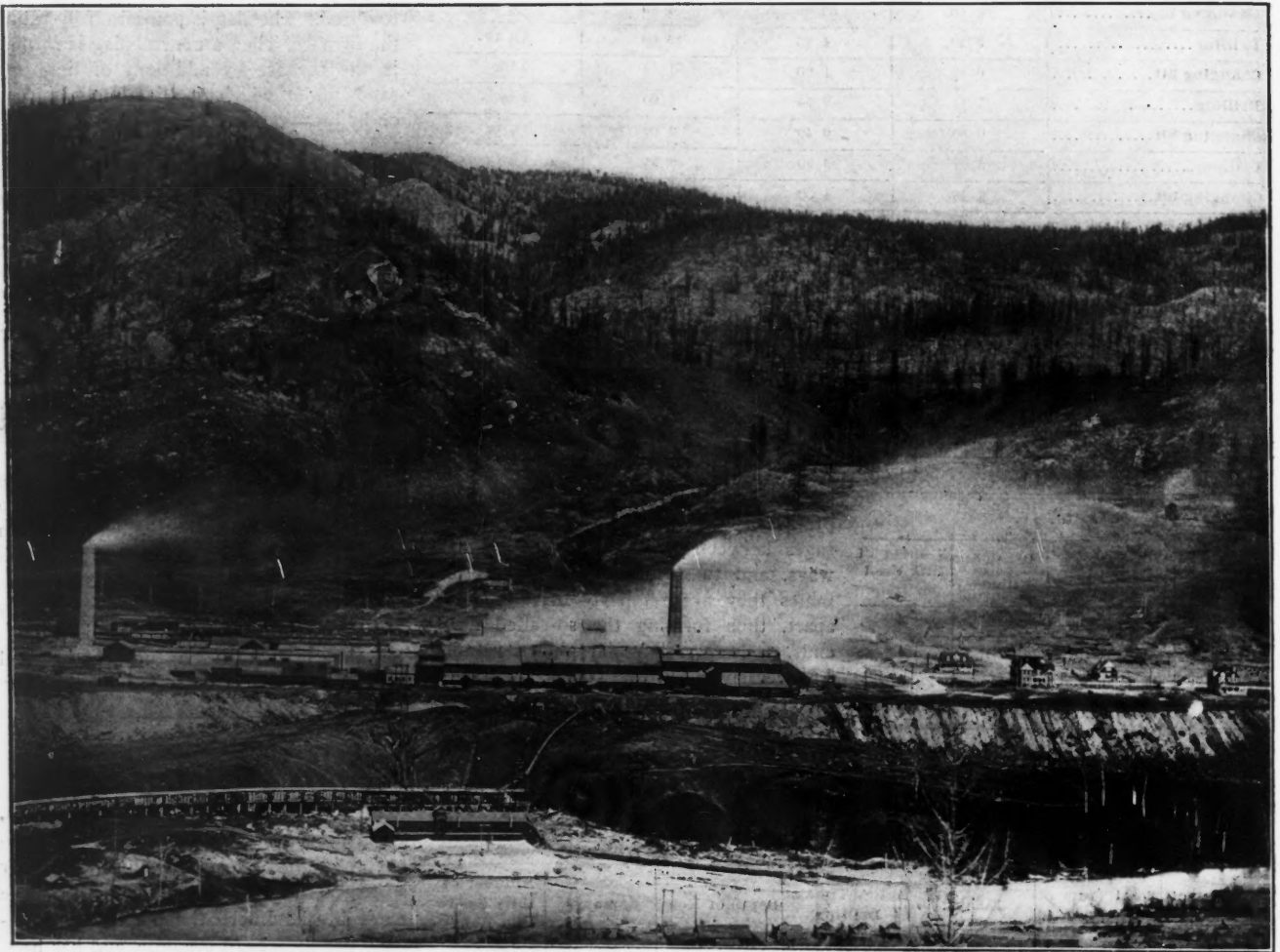
### Copper Converter Melting its Own Matte.

BY E. JACOBS.

At the British Columbia Copper Company's smelting works at Greenwood, Boundary district, British Columbia, a copper converter has been operated in an emergency under unusual conditions. The company is replacing the 700- to 800-ton plant it has been using since early in 1901 with a thoroughly up-to-date plant to have a treatment capacity of 1500 to

was thoroughly alight about 1500 lb. of coke was dumped on it and a light blast of air was admitted to hasten combustion. When the fuel became red-hot all through, some three tons of cold matte were placed on top of the brightly burning coke and the full pressure of air was turned on. The matte quickly melted and more matte was immediately added, to increase the volume of the charge. When this was also melted the slag was partially skimmed off and still more matte was added. This operation was repeated until there was sufficient molten matte in the converter to

Operations have been extended over several weeks, so that the commercial practicability of thus running a copper converter has been amply demonstrated. Of course it should be understood that its operation under such conditions is not economical and would only be carried on temporarily on account of the accumulation of slag, which must be smelted in the blast furnace, but as an emergency operation, in a case where there was a quantity of matte on hand which it was necessary to treat while the blast furnace was shut down, it was here proved successful.



REDUCTION PLANT, GRANBY CONSOLIDATED.

1800 tons per day. The two smaller blast furnaces were removed some weeks ago and heavy excavation work and the building of substantial masonry foundations had to be completed before the three larger stacks could be installed. Meanwhile, in order to carry out a contract with another smelter, it became necessary to convert a quantity of copper matte, notwithstanding that there was no blast furnace available in which to melt it.

The converter in use at Greenwood is of the ordinary barrel type, of 84 in. diameter by 126 in. long with about 4500 cu. ft. of free air available at 10-lb. pressure. The method of procedure was as follows: A wood fire was first lighted in the bottom of the converter shell and when this

admit of the converting of the charge being properly finished. From the time of commencing to fire the cold shell until the blister copper was poured an average of  $3\frac{1}{2}$  hours elapsed. About 15 tons of 40 to 50-per cent. matte were converted in one stand in one ordinary shift.

As a result of the experience gained it was found that a 45-per cent. copper matte could easily be handled in the above described manner and finished hot. Matte of a higher grade, up to about 55 per cent., was also successfully converted, but with this more care was needed to maintain the requisite heat and occasionally it was found necessary to add a few hundred pounds of coal to prevent the "freezing" of this charge.

The manager of the British Columbia Copper Company is J. E. McAllister, formerly with the Tennessee Copper Company at Ducktown, Tenn. The carrying out of the operations above described fell to Geo. Williams, construction engineer at the Greenwood works, who after a few experiments found that he could convert the matte without the assistance of the blast furnace, and did so.

Portland cement made in the United States has now practically displaced every form of imported cement. Domestic portland cement, in the 24-hour and seven-days test, shows a greater tensile strength than imported cement, in addition to carrying a larger proportion of sand.

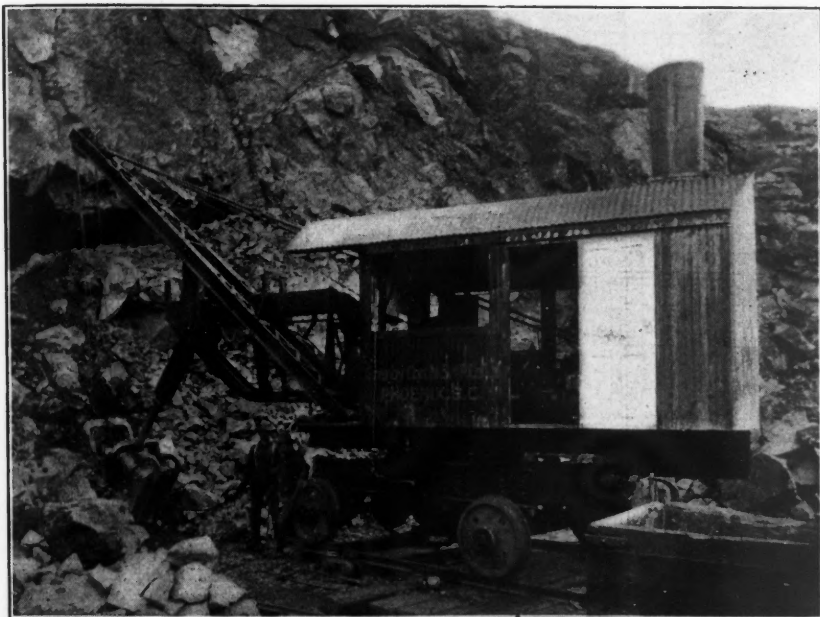


## The Granby Mine, British Columbia.

SPECIAL CORRESPONDENCE.

The history of the Granby Consolidated Mining, Smelting and Power Company, Ltd., is too extensive, constituting practi-

The smelter at Grand Forks was erected and it grew from a two-furnace plant, reducing 700 tons of ore, to one of eight

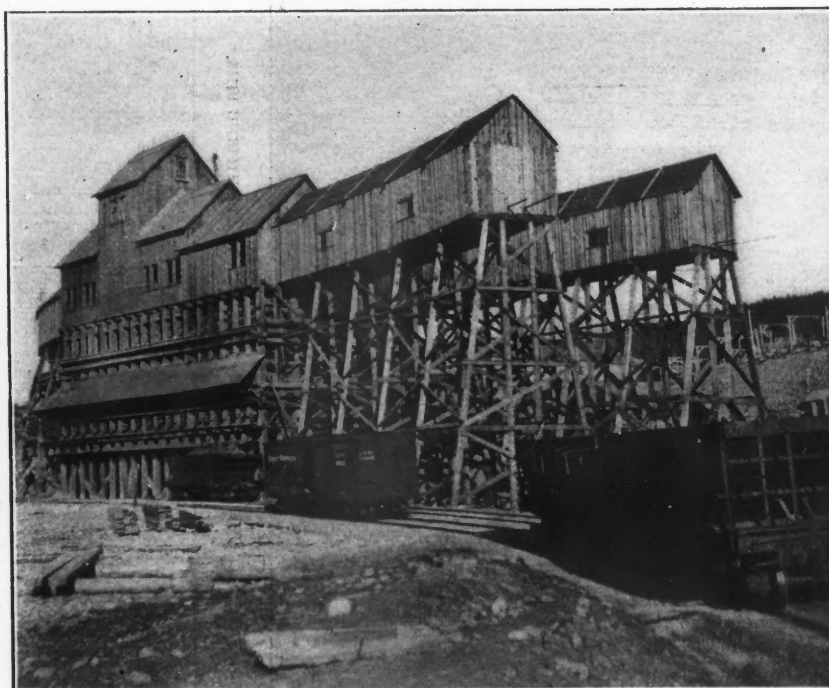


STEAM SHOVEL HANDLING ORE IN OPEN CUT.

cally that of the Boundary district, to be completely dealt with in a short article. From a mineral location scorned by many prospectors the property has grown and developed until today it is treating 2700 tons of Phoenix ore per day in a smelting plant equipped with eight furnaces and every economizing device known to modern practice. The mines at Phoenix are equally well equipped, and since July, 1900, the production has steadily advanced.

In 1891 White and Hotter staked their claims, and four years later the Old Ironside Mining Company was organized; the following year the Knob Hill Gold Mining Company was formed. Later a consolidation was effected, and since 1895 developments have been constantly carried on throughout the group. In the early days of this section a low-grade copper property did not appeal to the investing public and capital was difficult to obtain. Finally Canadian capital was secured and developments progressed on a large scale, showing gigantic orebodies. Since 1898 many miles of development have been performed under the supervision of W. Y. Williams, and later of A. B. W. Hodges, who in 1904 entered upon control of the entire operations. More claims were acquired and the first Granby Smelting Company and the Gray Eagle company were organized. These four were eventually consolidated in the Granby Consolidated Mining, Smelting and Power Company, Ltd., with a capital of \$15,000,000 (\$13,500,000 issued) and owning in all 25 claims in the Phoenix district.

furnaces treating 2700 tons daily. Smelting is greatly facilitated by the self-fluxing nature of the ore and the cost of treatment is reduced to the minimum. The



ORE-CRUSHING AND SHIPPING BINS.

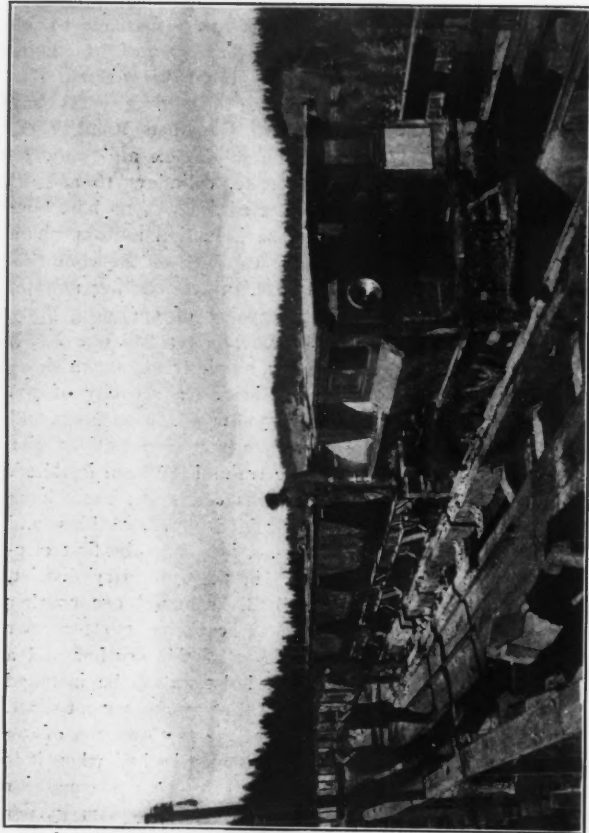
mines at Phoenix are capable of producing 5000 tons per day. Great changes have occurred in the steam plants in the past seven years. The equipment up to 1900 consisted of two 10-drill compressors, one at Old Ironsides and one at

Knob Hill. At present a 60-drill tandem compressor, operated by electricity, is ample for drills, pumps and hoists.

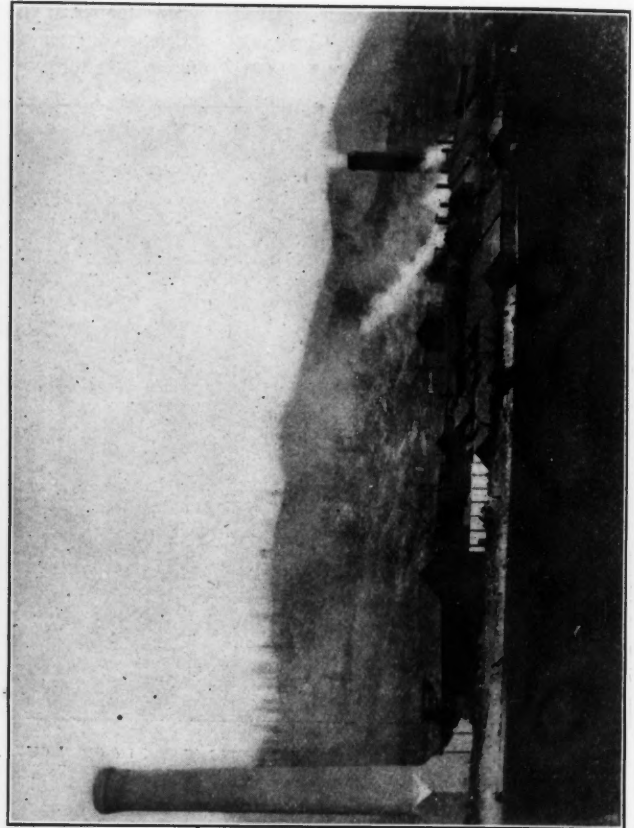
Inasmuch as the ore is of very low grade, every effort has been made to introduce modern mechanical methods wherever a saving might be effected. The installation in the last three years has consisted of two Canadian Rand, class D, cross-compound, duplex air compressors (36-in. stroke, cylinders 16 and 28 in.), rope-connected to two 700 h.p., type C, Westinghouse induction motors. The combined rated capacity of the compressors is 8228 cu.ft. of free air per minute, and they are capable of operating sixty 3¼-in. drills. One No. 1 and one No. 3 Thew automatic, single truck, steam shovels, the former having a capacity of 700 and the latter 1500 cu.yd. in 10 hours, and two 9x14 saddle-tank locomotives for hauling the ore trains have been installed. In addition to this equipment there have been recently added new ore bins and electrical haulage, including the first electric locomotive in the Boundary district, and a style B Blake-Farrel ore crusher (jaws 42x36 in.), capacity 150 tons per hour. A duplicate of this crusher and a 250-h.p. electric hoist are to be installed at the new main three-compartment shaft.

Some idea as to the vast quantity of ore in these properties may be had when it is stated that mining can be continued for many years at the rate of 3000 tons per day, and that a tunnel at a depth of 1500 ft. will open up millions of tons more.

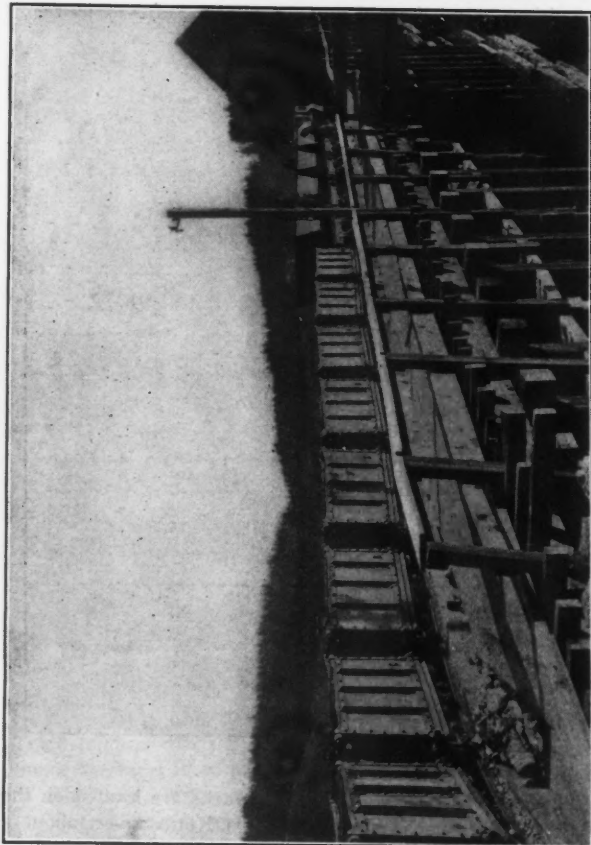
The reduction works are located on the North Fork of the Kettle river, about a mile above the town of Grand Forks, and are the largest in Canada. Here economical methods are just as apparent as at the mines and the science of smelting has



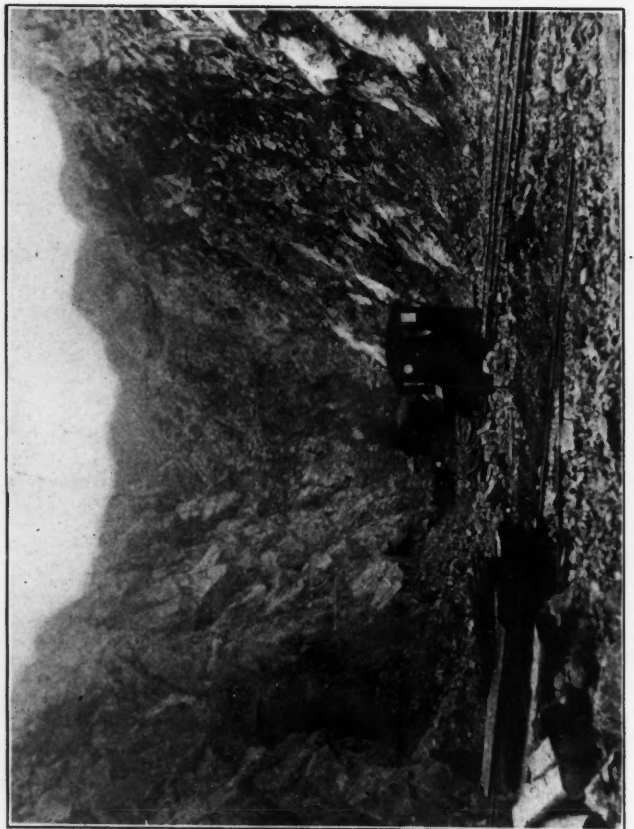
MINE TRAIN WITH 10-TON STEEL AND 6-TON WOODEN ORE CARS.



ANOTHER VIEW OF THE REDUCTION PLANT.



NO. 2 TUNNEL, MINE ORE TRAIN DISCHARGING ORE AT SHIPPING BINS.



STEAM SHOVEL MINING ORE IN OPEN CUT.

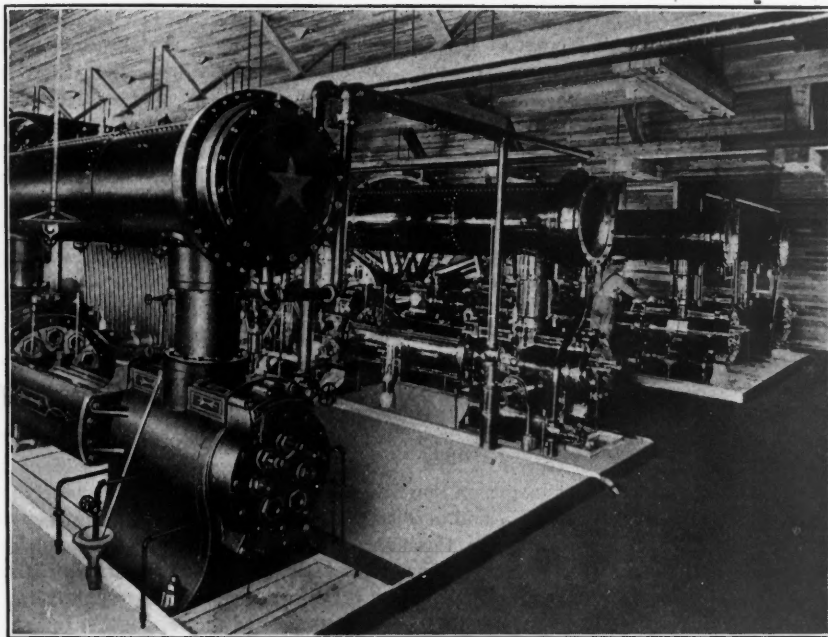


reached a high state of efficiency. Water power is converted into electrical and transmitted from the company's own falls, near the smelter, and also from Cascade on the Kettle river, 13 miles distant. The West Kootenay Power and Light Company is completing a high-tension line from Bonnington Falls, 60 miles away.

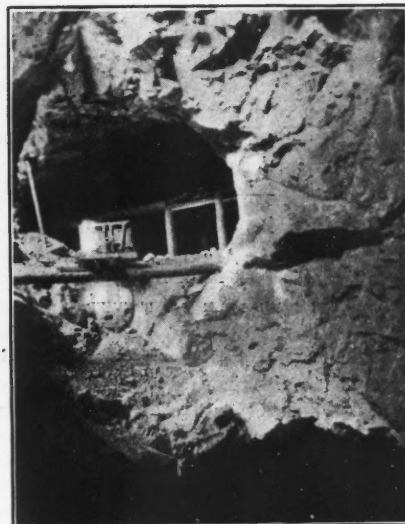
The smelter is able to produce 30,000,000 lb. of copper per annum. The production for the year ended June 30, 1906, will be over 20,000,000 lb. At first the matte containing 50 per cent. copper produced by the blast furnaces was shipped east and converted into blister copper, but now a three-stand converter plant has

ore which this shovel is handling. The bucket of this shovel holds  $\frac{3}{4}$  yd. The steam shovel has been worked on the open cut for about three years, but has recently discontinued for the reason that the portion of the orebody upon which the steam shovel's tracks are laid is now undermined from the level below, and consequently the whole thing has been taken out.

Two views show the smelter as it is today. At the present there are three



AIR COMPRESSOR.



SEMI-OPEN CUT.

With all this available power a shortage is not anticipated.

Automatic chargers (invented by Mr. Hodges and patented in the United States, Canada and Great Britain) were installed last summer and have proved satisfactory. It is claimed that this method of charging effects a saving of \$80,000 per annum on six furnaces. The plant has eight furnaces, which are divided into

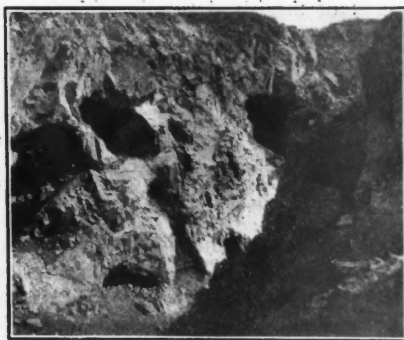
been added and blister copper is shipped.

The accompanying engravings are made from recent photographs of the Granby mine, and will give a good idea of its present magnitude and the system of mining employed. There are two pictures illustrating the method of mining ore with steam shovel. The one showing the steam shovel and the engine and the ore cars, and also the open cut, gives a good idea

furnaces, 48x212 in. at the tuyeres, and five furnaces 44x167 in. It is now the intention of the company to remodel the five small furnaces and make them the same size as the larger ones, which will make the smelting capacity be about 3500 tons per day; this work is now going on. A third converter stand has recently been added to the converter department, which makes three stands in all, 5x8 ft., capable



SEMI-OPEN CUT; ALL IN ORE.



OPEN CUT LOOKING SOUTH.



OPEN CUT LOOKING SOUTH.

groups of two, each group being charged by one motor train, consisting of two or three side-dumping, four-compartment cars. The trains are loaded with the proper proportion of ore and fuel and operate over a mile of track throughout the yards. This method is the only one of its kind in British Columbia, the United States or Mexico.

of what the company is doing in this line; until recently it has been the only copper mining company which has resorted to this method of mining. On the right of this picture is shown the foot wall; on the left is still ore and the face (which is 190 ft. high) is still in ore. The other view of the steam shovel shows a nearer view and illustrates the large size of the pieces of

of producing 30,000,000 lb. of copper per year.

Two views illustrate the kind of ore cars used in the tunnels of the mine. Two large tunnels, called No. 2 and No. 3, are operated. The two views illustrate the work train in No. 2 tunnel drawn by a small steam locomotive. There are two types of ore cars; one a 10-ton steel car

and the other a 6-ton wooden car. No. 3 tunnel has the same type of train, except that the motor power is a 75 h.p. electric locomotive with trolley wire.

Another view illustrates the cylinder end of the 60-drill compressor which furnishes air to all the mines of the company. Another shows the crushing and shipping bins in connection with the Great Northern railroad. There is a 42x36-in. Blake-Farrel crusher which has a capacity of 3000 tons per 24 hours and crushes rock to about 6-in. size, which is then elevated up into shipping bins capable of loading a railroad train of 1000 tons in half an hour. A very interesting photograph shows the open cut which is exposing the old stopes and workings of several years ago; this gives a good idea of the enormous proportions of the orebody.

### Mining in Ketchikan District, Alaska.

BY WILLIAM M. BREWER.\*

The statement that prospecting can be carried on in this part of southeastern Alaska during March will probably appear fabulous to people in the United States and especially in Colorado, Idaho, Montana, or South Dakota. This year such was indeed the fact, there having been no snow on the mountains that month below 1800 ft. above sea-level, and but very little below 2500 ft. Since 1901, I have visited this district every winter and have seen none so severe that regular mining operations could not be carried on without interruption every month during the twelve, provided the camp were properly equipped, but such work as building tramways should not be attempted usually later than November, though it could have been done during the past winter.

Today Prince of Wales island is the most important part of this mining district, which embraces all of southeastern Alaska south of Wrangell and north of the Canadian line, a distance of about 150 miles, and including all of the islands adjacent to the main land. As for the main land, practically nothing is yet known about it on the United States side, but on the Canadian side good prospects for lode or quartz mining have been discovered on Maple bay, also at the head of Portland canal, and on the Unuk river, while placer mining has been carried on successfully ever since the sixties in the Cassiar district up the Stickine river, which empties into the sea near Wrangell.

The first discoveries in the Ketchikan district were bodies of copper ore at the summit of a mountain on the west coast of Prince of Wales island, now known as Copper mount, situated in a bay making off from Hetta inlet. These orebodies consisted of extensive outcroppings of copper carbonates, occurring as contact

deposits between crystalline limestone and garnetiferous felsite. These discoveries were previous to those of placer gold in the Klondike, but, because of their remote situation, little attempt was made to develop until about 1901, when quite a stampede took place to Ketchikan, where the Customs House had been established by the United States Government the previous year. Prospectors then turned their attention to the east coast of Prince of Wales, Revillagegedo, Gravina, and other islands, as well as to the Cleveland peninsula on the main land. Their labors were rewarded by several promising discoveries of copper and gold ores. The most prominent of the former were on Kasaan peninsula and Niblack anchorage, Skowl arm and Karta bay, on the east coast of Prince of Wales island, together with those already mentioned on the west coast. The discoveries of gold ore that attracted the most attention were those made at Sea Level on Revillagegedo island, at Dolomi and Hollis on the east coast of Prince of Wales island and others on the east coast of Gravina island, as well as some near Copper mount on the west coast of Prince of Wales island.

So much for the past history of this mining district. The remainder of this article will describe the conditions of today.

Development on Prince of Wales island has been much more extensive during 1905 than in previous years, and the prospects for extensive development during the present year are excellent. On the west side of the island, on Hetta inlet, there are four working mines and a smelter. The latter is located at Copper mount, having been built with a view to treating the carbonate ores occurring in the near neighborhood. At this plant several short runs have been made and the management is arranging for suitable transport of iron ores from the east coast of the island to mix with the carbonates.

The Alaska Industrial Company, which owns about 50 mineral claims on Jumbo mountain and in the Jumbo basin, has opened up its properties sufficiently to warrant a system of tramways to transport the ore from the mine to the beach. The Corbin mine, situated within a few hundred feet of the beach and between Copper and Jumbo mountains, has recently been purchased by George E. Bent and associates, who are continuing the development and will be shipping during the summer. The Wyman mine, which is also situated on Hetta inlet, about seven miles below Copper mountain, is being operated on a limited scale and ore is being shipped. These mines all produce copper ore of good grade, the carbonates from Copper mountain carrying sometimes as high as 30 per cent. copper with gold and silver.

The geology of the west coast, at least on Hetta inlet, differs considerably from that on the east coast. In fact, the only

oxidized zone that I know of on this island occurs on Copper mountain where the country rock is crystalline limestone and garnetiferous felsite. On Jumbo mountain a belt of the same formation occurs with its trend toward the north-west, but the ore is a sulphide, occurring at a lower altitude than the carbonates on Copper mountain. Paralleling this belt occurs a contact between crystalline limestone and granite with dykes and masses of greenstone. In this belt there are extensive deposits of magnetite, carrying chalcopyrite, having the same north-westerly trend and dipping toward the southwest, which is also the dip of the orebodies in the limestone and felsite belt already referred to. These occurrences of ore are located from one to three miles back from the beach. Another mineral zone occurs within a few hundred feet of the beach where the orebodies are in a greenstone schist, and in veins instead of contact deposits. The Corbin and Wyman orebodies are illustrations of this type.

At Hadley, on the north side of the Kasaan peninsula, are the smelter and mines of the Brown Alaska Company and the mines of the Hadley Consolidated Mining Company. To the south of these, on the same peninsula, but slightly to the west, are located the Mount Andrew mine, the White Eagle and other prospects. The rock formation of this peninsula is chiefly greenstone with occasional limited belts of limestone made crystalline by metamorphism through the greenstone intrusions. All of these orebodies are magnetite, carrying chalcopyrite in sufficient quantities to give the ore commercial value.

At the present time the Brown Alaska Company is mining a considerable tonnage daily from the Mamie mine, about half a mile in the mountains back from the smelter, the latter being situated on the beach of a bay originally known as "Hole in the Wall," which affords a good safe harbor for deep-draft vessels. The Hadley company is mining about 100 tons of ore per day, which is delivered to the smelter of the Brown Alaska Company for treatment.

On the south side of the peninsula development work is being carried on at the Mount Andrew property, which is under bond to the Britannia Copper Company, of British Columbia. Arrangements have been made for the construction of an aerial tramway, bunkers and wharf to facilitate transportation of the ore to the Britannia company's smelter at Crofton on Vancouver island. About 15 miles west from the last mentioned property occurs another mineralized zone on which discoveries have been made, near the head of Kasaan bay, the most prominent of which is known as the Rush and Brown property. About 50 tons of ore per day is mined here by the Alaska Copper Company, of Copper mount. This ore is a magnetite carrying chalcopyrite and forms

\*Mining engineer, Victoria, B. C.



a very desirable mixture with the copper carbonates for that company's smelter. In this same vicinity several other prospects have been partially developed, but none is yet at a shipping stage.

The other properties on the east coast of the island from which ore is today being shipped are the Khayam at the head of Scowl arm and the Niblack mine at Niblack anchorage, the former of which is operated by the Omar Copper Company. The products from this property are shipped to the Tye Copper Company's smelter at Ladysmith, on Vancouver island. The character of the ore is chalcopryrite associated with pyrrhotite and marcasite, the former being in sufficient quantities to give the ore commercial value. The Niblack mine is operated by the Niblack Copper Company, of Milwaukee, Wis., and the product is shipped to the Tacoma smelter at the rate of about 50 tons per day. In character this ore is similar to that produced at the Khayam mine.

Development of greater or less extent is being performed on several other prospects which carry copper, but none of which has yet entered the shipping ranks, although several will probably be included in that list before the end of the year.

Gold ore, some of it of exceptionally high grade, is found on the east coast of Prince of Wales island near Dolomi post-office, a short distance northeast from the north arm of Moira sound, and near Hollis, at the head of Twelve Mile arm of Kasaan bay. Five-stamp mills have been erected at both these points, and ore is treated there, but the largest output has been from the Valparaizo mine at Dolomi, from which several shipments have been made to the Tye company's smelter on Vancouver island.

The only other shipper today in the Ketchikan district is the Goldstream mine on Gravena island, three miles from Ketchikan. This is the only shipper owned and operated by local men, the owners being Otto Miller, the original locator, and George Irving and Harry Brice, both business men and residents of that town. During 1902 this property was under bond to Charles D. Lane, of San Francisco, who, after erecting a five-stamp mill and doing considerable development work, threw up the bond. Since then the partners have been extending the development, milling the lower-grade ore, which yields by amalgamation about \$8 per ton, and shipping the higher-grade ore and concentrates to the Tye Copper Company smelter. The quartz, carrying the gold values, occurs here in lenses in a talcose schist country rock. The property has been developed only to the depth of 100 ft., and along the line of strike towards the southeast about 200 ft. A parallel orebody carrying galena with silver and gold has been prospected to about the same depth, but no ore has been shipped. This belt of schist has considerable extent on Gravena island and sev-

eral other discoveries of the same character have been made and developed to a limited extent.

On Revillagegedo island, on the west side of which is situated the town of Ketchikan, are located several mineral claims in schist formation, but the only serious attempt at development has been made at the Sea Level property on Thorn arm about 20 miles southeast of Ketchikan, where, during 1902, a 30-stamp mill, equipped with concentrating tables, was built and operated for some months, but has since remained idle because of some unsettled questions between the owners.

Of the prospects on the mainland on Cleveland peninsula and on the Unuk river in United States territory but comparatively little is known at present. Each year assessment work is performed on several of these prospects, and at the present time the owners of the Golden Standard property on Helm bay are developing with a view to shipping ore.

### The Enterprise Mine, Platteville, Wis.

#### STAFF CORRESPONDENCE.

At Platteville the producing mines are the Enterprise, Empire and St. Rose. There are several promising mines which are being developed, viz.: the Hibernia, Great County, Great Northern, Big Jack and the Clar-Piquette. Also there is much churn drilling going on in the district.

#### MINING.

Near the surface this mine was worked for galena, but in depth considerable dry bone was found. In sinking the shaft deeper, several feet of "brangle" ore was passed through, and finally the present large deposit of blende, which lies in thin sheets in a series of flats and pitches, was struck. The top flat starts at a level of about 83 ft. and then pitches at a low angle toward the south down to another series of flats at about 100 ft. below the surface. The deposit in the part of the mine which is being worked at present is from 80 to 100 ft. wide, and occurs through a vertical range of about 50 ft. These flats and pitches have been worked for about 1000 ft. along their strike, and vary from a few inches to a foot or more in thickness. The ore contains considerable galena along with the blende and marcasite.

The mine is worked by two shafts, one 125 ft. deep, the other 140 ft. deep. These are about 100 ft. apart.

The ore is mined in a series of slices, the top slice being broken with the machines set on bars, while machines on tripods will be used for the lower slices. A top slice about 8 ft. high is taken. Ingersoll-Sergeant 2¾-in. drills are used. A water line is carried along with the air line and water is squirted from a nozzle into the hole being drilled. This

water pipe connects with the column pipe, so that a good pressure is obtained. Two men with a 2¾-in. machine, using air at about 80 lb. per sq. in., drill about 8 or 9 eight-foot holes in a shift. They use a sludge gun made of a ¾-in. pipe into one end of which a nipple is fitted. This nipple is bored so that a marble will seat itself securely on it. A marble is then dropped into the pipe and a small pin put through the pipe so as to keep the marble from falling out. The marble has about 3-in. play up and down. The sludge in the holes is pumped out by moving this up and down in the hole.

Pillars about 15 ft. in diameter are left whenever it is thought that the roof requires them. These pillars are vertical when they are left in flats, but if they are to support the roof in a pitch they are left about perpendicular to the roof. The stopes in the upper flats would be very poorly ventilated were it not that the superintendent, Robert Young, devised the plan of extending a branch from the air pipe so that it runs up about 2 ft. into a 6-in. churn-drill hole, which came down from surface to the top flat. This pipe, which is of 2-in. diameter the same size as the main air pipe, is fitted with a valve. Just before blasting, this valve is left wide open for a while. A fine circulation is started up and the smoke from blasting soon leaves the mine.

The ore is shoveled into wheelbarrows; at the same time the waste is sorted out, and stored underground so far as possible. Mucking and blasting are done on both shifts, but drilling is done only on day shifts. The muckers clean up each night, so that there is a good, clean breast for the machines.

The machines, four in number, break 170 tons a day; about 50 tons of waste is sorted out of this. About 50 men (on both shifts) are employed at the mine. There are 25 shovelers and eight machine men. The wages are, for 9-hour shifts, machine men \$2.25, shovelers, \$2.

#### MILLING.

The ore from the mine is hauled in wagons to the mill, where it is dumped on a platform and shoveled into a car which runs up an incline, where it is dumped into the mill bin and again shoveled; this time going into a 15x7-in. Blake crusher. Water is added, and the crushed ore goes to a set of 24x15-in. Cornish rolls. The ore then is elevated by 16-in. belt elevator to a double trommel, having perforated sheet screens with 5/16-in. and 1/8-in. openings. The oversize from the 5/16-in. goes to a set of 18x15-in. Cornish rolls, which deliver again into the main elevator. The undersize from the 1/8-in. screen goes to a Galena classifier, and the sands from this go to a Wilfley table, where a lead concentrate is made. No attempt is made to save the blende on this table. The undersize from the 5/16-in., and the sands from the hydraulic classifier, go to an 8-

cell Cooley jig. On the first cell clean galena is made. The concentrates from the second and third cells are returned to the main elevator, while clean blende is made on the next four. The product of the last cell is returned to the main elevator. The sizes of screens on the jig are as follows: No. 1 cell, 3/16 in.; Nos. 2 and 3, 1/8 in.; Nos. 5, 6 and 7, 1/8 in.; No. 8, 1/8 in. Perforated screens are used on all. The tailings are elevated by a belt elevator and go to a trough which carries

having 1/4-in. and 1/8-in. perforations. The oversize from the 1/4-in. screen goes to a pair of 8x12-in. rolls, and is re-crushed and sent back through the roaster. The undersizes from the 1/4-in. and the 1/8-in. screens are kept separate, going to two bins each of which holds about five tons of ore.

These sized products are fed separately to a Cleveland-Knowles separator. The voltage on the magnets is about 125, while a current of three amperes is used on the

iron tails from the separator carry about 4.5 per cent. zinc. This shows a zinc saving of about 90 per cent., but this is only a doubtful approximation, as the figures are merely guesses by operators of the plant. In all probability the saving does not exceed 85 per cent.

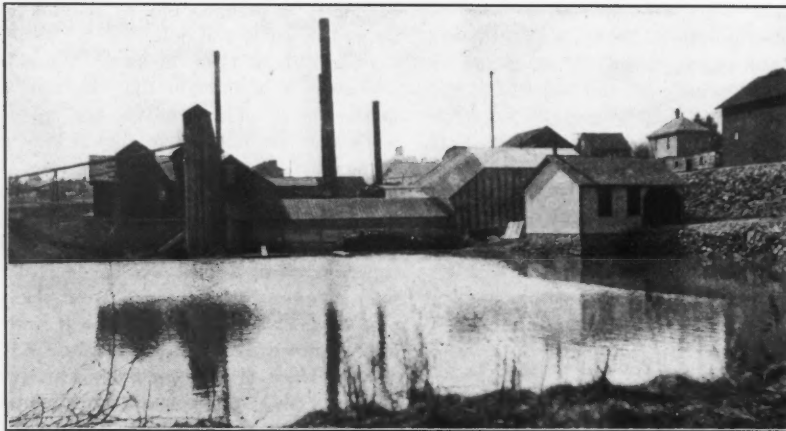
The roaster requires three tons of coal a day. The cost, exclusive of the power to run the plant (which amounts to 15 h.p.), is as follows:

3 men @ \$2.00.....	\$6.00
3 men @ \$1.50.....	4.50
3 tons coal @ \$3.50.....	11.50
Total.....	\$22.00

This makes the cost of treating 15 tons of ore amount to \$1.47, without allowing for the cost of power, repairs, renewals and miscellaneous supplies, general expense, etc.

Since the mill has been re-jigging the middlings from the magnetic separation the zinc contents of the magnetic concentrates has dropped from 60 to 62 per cent. zinc to about 59 per cent. zinc.

Internal strains reduce the specific gravity of a piece of iron or steel. Consequently, the metal is heaviest when it is in the annealed state. It is common to assume that a piece of steel which has been cold-hammered, or cold-rolled, or wire-drawn is "more dense" after these operations than it was before, when it is actually lighter. Internal strains accompany if they do not indeed cause inferior resistance of the metal to chemical action. A file broken off, and the broken end immersed in dilute hydrochloric acid,



ENTERPRISE MILL, PLATTEVILLE, WIS.

them to the dump. The zinc concentrates from the jig go to the roaster.

The power plant consists of three boilers; a 60-h.p. and a 50-h.p. boiler are used all the time, while a 100-h.p. boiler is held in reserve. A 40-h.p. Brownell engine runs the mill, while another 40-h.p. Brownell engine runs a 30-kw. generator (125 volts, 240 amperes), which operates the hoist at the mine, and also furnishes the roaster with power and does the lighting. The power plant burns about six tons of coal a day. There are five men working on each shift in the mill, and a fireman and engineer on each of the 12-hour shifts in the engine room. The wages are: jigmen, \$3; helpers, \$1.75; engineers, \$1.75; firemen, \$1.50; feeders, \$1.75; shovelers, \$1.75.

The mill treats about 120 tons of mine dirt in the two 10-hour shifts, and makes about 15 tons of blende concentrate in 20 hours, and about 3500 lb. of galena concentrate. The mill tailings vary from 0.7 to 1.80 per cent. zinc. The blende concentrate carries from 30 to 45 per cent. zinc, 15 to 17 per cent. iron, 0.3 per cent. lead, and 2.5 per cent. lime.

#### MAGNETIC SEPARATION.

This crude concentrate from the mill is treated in a magnetic separating plant close by. It is hauled in a self-dumping car up an incline and dumped into a 75-ton bin in the roaster building. The ore from this bin is conveyed by a link elevator to the hopper, which feeds a Galena roaster. A screw conveyor takes the ore from the roaster to an elevator which delivers it to a double trommel

per shift. The plant treats about 15 tons of crude concentrate per day. This gives about 2500 lb. of middling product and about 11 tons of finished jack. The crude concentrate assays 30 to 45 per cent. zinc, 10 to 17 per cent. iron, 0.3 per cent. lead, and 2.5 per cent. lime. The zinc product from the separator goes about 59 per cent. zinc, 1.9 per cent. iron, and 1.8 to 2 per cent. lime. The zinc middlings vary from 7 to 10 per cent. zinc. The

first magnet and five amperes on the second. The zinc product goes off the end of the belt and through a chute to a car. The middlings are sent back to the jigs to be re-treated, while the iron tails are hauled away from time to time to the dump.

The roaster is run three 8-hour shifts, there being two men on a shift. The roaster man gets \$2 and the helper \$1.50



ENTERPRISE MILL, PLATTEVILLE, WIS.

per shift. The plant treats about 15 tons of crude concentrate per day. This gives about 2500 lb. of middling product and about 11 tons of finished jack. The crude concentrate assays 30 to 45 per cent. zinc, 10 to 17 per cent. iron, 0.3 per cent. lead, and 2.5 per cent. lime. The zinc product from the separator goes about 59 per cent. zinc, 1.9 per cent. iron, and 1.8 to 2 per cent. lime. The zinc middlings vary from 7 to 10 per cent. zinc. The

has been found to have lost a greater thickness of metal from the hardest part, at and near the outside, in which the strains are greatest, than from the less hard central portion. The quick corrosion of wire nails and wire fence may possibly be ascribed to the cold-worked condition, and directly or indirectly to the internal strains. The corroding agent more readily enters the mass of the metal, it may be, because of larger intermolecular spaces.



## Colliery Surveying and Office Methods—I.

BY F. W. PARSONS.

In keeping with the rapid advance made by mining practice toward more improved systems of operation, the methods used by the mine surveyor have likewise attained an improved degree of efficiency. It has not been long since a feeling prevailed, among many superintendents, that an engineer was an unnecessary addition to the operating staff of the mine. The work and suggestions of the engineer were often regarded lightly, if not actually resented, and such mistakes as could be attributed to the surveyor were lastingly remembered.

Ideas have now changed considerably, due in part to the keen competition in mining and absolute necessity of carrying on operations only in accordance with some outlined plan; and in part to the fact that our mining engineers are now drawn from the ranks, and whether college trained or not, they are compelled to advance through a series of hard duties which make them practical and thoroughly conversant with the actual conditions underground. Indeed, the larger mining companies now depend almost entirely on the engineering force to supply the necessary superintendents and managers.

The crude method of surveying, either underground or on the surface, with a compass and chain has been generally abandoned. Likewise, the methods of calculating and plotting surveys with a protractor have been declared obsolete. There are some phases of mine development where American engineers might profit by observing the systems used by mining men abroad, but as to careful, correct methods of surveying, it is hardly possible that we have our equals in any other country.

As to the kind of instruments best to use, it is not possible to specify any one that would answer all requirements and act equally well under all conditions. Although in mine work there is little necessity for ever using the compass needle, nevertheless every mine transit should be supplied with a compass, which serves as a rough check on all vernier readings. Mine transits should also be supplied with telescope legs on the tripod, spirit level under the telescope, complete circular vertical arc rigidly attached, stadia wires in the telescope, and when the instrument is for use in metal mines, a solar attachment is necessary; in coal mines, except where there is a steep and variable dip of the seam, the solar telescope is not necessary.

As to plumb-bobs, I cannot believe there is any advantage in using one that weighs less than 14 oz.; for in most mines there is a stiff current of air circulating, which deflects a light plumb-bob so that time and accuracy are sacrificed in making the set-up. The 18-oz. brass plumb-bob, with

steel point and long neck, is favored by many expert surveyors. In outside triangulation work, where the stations are located on high hills or mountains, a still heavier plumb-bob (24 or 32 oz.) is needed to withstand the high winds that usually blow at such points. Plumb-bobs having a reel inside, on which the line is wound and held by friction at any point of its length, have not proved popular with many engineers, which is due to delay often caused by a twisting or catching of the cord on the reel. One of the cheapest and most satisfactory devices that can be used for raising and holding the plumb-bob at any desired height is a small thin stick,  $\frac{1}{2}$  in. wide and 2 in. long, with 3 holes equally spaced and punched through it. The cord is so arranged through these holes that the plumb-bob can be raised or lowered quickly to any height, and is held there by friction.

A sun-shade is often attached to the end of the telescope and is used to prevent a glare of light from entering the telescope and obscuring the vision. Such an arrangement acts satisfactorily, but prevents plunging the telescope when it may be desired.

Almost all surveyors have certain fixed ideas, gathered from practice, concerning the style or kind of personal equipment to use. Some desire small magnifiers for reading the vernier, others prefer large glasses. One transitman will use nothing but a copper lamp which does not attract his needle, while others will use ordinary tin miners' lamps.

It is well to speak here of the advisability of experimenting with acetylene lights as an aid to the mine surveyor. No light is so brilliant, and few as clean or easily handled. An oil light has to be continually shaken up and the wick examined to see that it is not too loose or too tight. If too loose, oil drips on the note book; if too tight, then it does not burn properly. In a few years, oil or candles will not be generally used in mine work, and nothing at present is more favorably considered as a substitute than acetylene gas.

There is hardly any item of a surveyor's outfit that has received as much attention as the measuring tape. Many styles have been devised, and a number of different schemes for marking graduations on the tape have been introduced. Thin ribbon tapes  $\frac{1}{4}$  in. wide, with graduations etched on the steel, were formerly much used, but at present the flat wire tape,  $\frac{1}{8}$  in. wide, 300 ft. long, with brass sleeves clamped or soldered on, and notched opposite the graduation for the exact locating of the plumb-bob line, are most favored. The ends of the sleeves are beveled to prevent their catching on obstructions when measuring. The first

five feet on each end of the tape should be graduated to feet and tenths, while the remainder of the tape should only have graduations every five feet. In reading the measurement, a small steel tape, five feet long and graduated to feet, tenths and hundredths, is used so as to insure greater accuracy. For taking side notes, the cheapest and best tape to use is the linen-metallic, either 25 or 50 ft. long, preferably the former length. These tapes can be bought by the dozen without cases, and as one tape wears out, a new filling can be put in the old box.

The next instrument deserving attention is the reel for winding up the tape; nothing else employed in surveying can so thoroughly handicap the progress of a party as when the chainman has to work with a clumsy, poorly constructed reel. It is almost impossible to use satisfactorily any of the reels made by the large manufacturers of surveying supplies, and this fact has made it necessary for some large companies to design and make their own reels. The requisites necessary in the proper construction of a reel are: (1) It should be exceedingly strong, so as to withstand the rough usage to which it is subjected; (2) it must be as light as consistent; (3) the crank for winding should be long, so as to give as great leverage as possible; (4) the reel should have some spring or spool arrangement that will continually press on the tape and prevent its unwinding or slacking off when the reel is laid down. One of the best reels made has been designed by a practical engineer in the anthracite coal region; the only disadvantage of this reel is its heaviness.

The stations that are put in a mine are generally of the variety called spads. A horse-shoe nail is flattened on the large end and a hole is punched through it, the nail is shortened to about  $1\frac{1}{2}$  in. and is sharpened on the small end. Spads pounded out from the cold seem to be strongest and to give the best satisfaction. As a general thing it is better to drill a deep hole (2 in.) and make it  $\frac{1}{2}$  in. diameter, than to have a shallow, wide hole. After drilling this hole, a soft wood plug is driven in and the spad afterward pounded into the plug. This makes a permanent station and one where the plumb-bob can be quickly suspended. Instead of putting the plumb-bob cord through the eye of the spad when giving a sight, it is quicker to have a small hook on the cord and suspend the plumb-bob by inserting this hook in the hole in the spad. When a sight is difficult to catch because of a smoky entry, much benefit is sometimes derived if the man giving the fore-sight will hold a piece of plain oiled paper behind the plumb-bob and hold his light back of this paper. No stations should ever be put in without carefully painting it and recording the number in the notes. It is also decidedly best not only to drive all rooms on centers, the

same as entry work, but also to number the stations in every room. The only place where this rule can be modified is when the rooms are very short and the coal level, so that the room-face can be seen from a station in the entry.

In numbering stations in a mine many systems have been used. In some cases, letters have been attached to station numbers so as to distinguish the location in the mine. In other instances each new cross-entry starts with No. 1 as its first station, so that every entry has a No. 1,

number of mines are kept. In some cases where the volumes are indexed in consecutive order, the outside survey books are placed on the same index with the underground note books. It is probably better, however, to have a separate index for all outside note books and use a different set of station numbers, beginning at one.

The abbreviations in the column showing the character of the survey may be interpreted as follows: T means transit survey; L means leveling. On an outside survey index, 'Tn should be added, mean-

NOTE-BOOK INDEX (Underground).

Vol.	MINE.	CHAR- ACTER.	STATIONS.	REMARKS.
1	Arcadia.	T	1 to 92	Main entry survey.
2	Chief.	T	1 to 104	Main slope and 1st right.
3	Delagua.	T	1 to 110	Main entry and air-course.
4	Arcadia.	T	93 to 200	2d left and rooms.
5	Delagua.	L	1 to 84	Levels along main entry.

2, 3, etc. I firmly believe that no system will prove as satisfactory to all concerned as the one in which the numbers of stations run up consecutively and are never duplicated. Let the first station at the mouth of the mine, or at the shaft bottom, be No. 1, and every other station put in take the next succeeding number. So strict should be the observance of this rule that when a station falls out and another one is put in to replace it, the new station does not take the old number, but the next number that has not yet been used. This avoids much trouble, for later on a reading may have to be taken over this new station, and if it has the old number and the old notes are referred to, an error may be committed from the station not being exactly in the old location. Even though the old plug is used, the new spad may be turned in a different direction sufficient at least to cause one or two minutes difference in the reading.

Each time when the mine is posted (surveys extended) the engineer takes the last unfilled note book with him for recording his new notes. Also, before going out, he examines the mine map and notes the numbers of the stations at the faces of whatever entries he intends to bring up, and going to the note book vault or case, where all field and mine books are filed, he takes out the books which contain the sights over the stations he has read from the map. In some instances the back sights are copied from the books, but it is generally best to take the old notes into the mine so they may be used to re-run a few stations or help to straighten out any errors that may be found. Each note book is numbered from one upward, and after being filled, the front page of the book should contain a note stating what station numbers are included in the book. A satisfactory method for indexing is here given, and applies to an office where data and maps for a num-

ber of mines are kept. In some cases where the volumes are indexed in consecutive order, the outside survey books are placed on the same index with the underground note books. It is probably better, however, to have a separate index for all outside note books and use a different set of station numbers, beginning at one.

The abbreviations in the column showing the character of the survey may be interpreted as follows: T means transit survey; L means leveling. On an outside survey index, 'Tn should be added, mean-

ing triangulation, and B.L. to specify baseline notes. Triangulation stations are most conveniently called by letters of the alphabet and by attaching a sub-number when all the letters have been used. It is also well to have a separate note book for each mine, in which only notes pertaining to important development such as tunnel work, bore-hole location, etc., are recorded.

In concluding this first article on mine surveying, I wish to call attention to two important rules that are often violated to the detriment of the work. First, when an error is thought to be recorded, the insertion should never be erased to allow writing in what is thought to be the correct notes or figures. A line drawn through the original record and the new reading written above will often save trouble later on. The second precaution is never to allow the transitman to consult the note book when he is hunting an error of a couple of minutes or more in re-running a tie. Taking it for granted that all transitmen are perfectly honest and conscientious in their work, it is nevertheless true that a reading known beforehand will often influence the reading on the re-run. The transitman should call out his vernier readings each time to someone carrying the note book, and should know nothing of former readings until the error is caught.

The increased strength of iron and steel wire due to the strains of cold working is made useful in many ways. In the wire cables of suspension bridges, it is relied upon and figured in as part of the tensile strength of the wire. In wire for piano strings and for deep-sea sounding tensile strengths of over 400,000 lb. per square inch have been attained, the greater part of which is due to the internal strains set up in the wire-drawing process.

### Sprinkling Arrangement for Preventing Formation of Coal Dust.

A new medium has recently been perfected, its object being to prevent the formation or rising of dust on the passages and exposed surfaces in coal mines, for the purpose of rendering the mines less injurious to health and minimizing danger in case of explosion.

Such result is obtained by treating said passages and surfaces with a sprinkling medium composed of water containing in solution chloride of calcium or chloride of magnesium, or both, as supplied in the trade or obtained as residues from certain manufactures, and especially from certain salines, after the extraction of the chloride of sodium and other salts. The two chlorides of calcium and magnesium may be used in any proportions, and about 20 to 25 deg. Baumé is a suitable density to obtain a good effect. Said medium is sprinkled or distributed over the surfaces under treatment by means of a hose furnished with a sprinkler and fed from a tank located either in the mine, at a suitable level to obtain the necessary pressure, or outside the mine, or by any other convenient method. The effect of such treatment is to bind the coal or other dust, and also to act to a certain extent as a non-inflammable and fireproof substance.

### Cape Colony Coalfields.

Large deposits of coal are found in the eastern part of Cape Colony, and are thought to be an extension of the Natal and Zululand coalfields. Although the quality of the coal is inferior, the demand for it is considerable, due principally to the fact that other coals have to be brought such a distance.

The coal seams are rarely over 8 in. in thickness, but at places several occur together, so that in a band of rock composed of coal and shale, 6 ft. in all, about 4 ft. of the whole may be coal. The coal is usually laminated and contains thin layers of silt. The abundant intrusion of dikes and especially sheets of dolerite have had an injurious effect on the quality of the fuel, the chief of these being the driving off of the volatile constituents and the partial coking of the coal. The analysis of this coal showed fixed carbon 51.38 per cent., volatile matter 18.26 per cent., ash 30.36 per cent.

Since 1899 the output has been practically stationary, amounting to 207,403 tons in 1903, bringing an average price of \$4.14 per ton. About 93 per cent. of the labor employed is native, each man producing on an average 95.7 tons of coal during the year.

Asphaltic materials occur in all forms, from fluids to solids, depending upon the amount of oxidation that the original compound has undergone.



### Automatic Appliance for Stopping and Re-starting Mine Cars.\*

BY W. GALLOWAY.

The appliance with which the following description deals has been installed at a colliery in South Wales, and successfully operated for more than a year, the weighing on the surface, and the loading and unloading of the cages at the top and bottom of the shaft being automatically effected without a hitch during this period. At Garth the appliance is worked by means of compressed air, but steam can be used and the details varied in many ways. As applied to weighing, the operation is as follows:

The axles of the full car, running at any velocity less than that required to overturn it, successively depress and pass over a pair of catches, which immediately rise up behind them. No sooner is the hinder axle clear of these, than the front axle, coming in contact with and pressing against another pair with the full force due to the momentum of the car, pushes the frame of the appliance and its connections, including the piston within a compressed-air cylinder, to a greater or less distance in the same direction from a few inches to a foot, according to the greater or less velocity at which the car has been moving. But the pressure of the air within the cylinder, now acting like a spring, arrests the forward motion of the car and then draws it back until it stands directly over the center of the weighing platform. The operation of weighing having been completed, the weigher places his foot on the foot-plate, and thereby opens a valve by which the air-pressure is withdrawn from the right-hand side of the piston, and the latter, together with the frame, is pushed toward the right-hand side and the first pair of catches, pressing against the hinder axle of any car that happens to be in front of them, drive it forward at a greater or less velocity, according to the size or diameter of the cylinder and the higher or lower pressure of the air acting on the piston. When the frame has nearly reached the end of its intended stroke, a spring fixed to the weighing platform arrests the forward movement of the rod: the second pair of catches are thereby depressed, and the car continuing to run forward after the frame has come to a standstill, passes over them, and proceeds toward its destination. As soon as the hinder axle of the car is clear of the catches, the weigher removes his foot from the foot-plate, the valve closes automatically, the pressure of the air on the right-hand side of the piston is restored and the frame is drawn back to its original position, ready to receive another car. The rapidity with which the frame is drawn back depends on the area of the

opening of a valve. The frame is covered with a sheet of iron to prevent coal or rubbish from falling into its interior, and the only openings in it are those through which the catches project. The points to be specially noted are that the moving cars are arrested gently, held in the desired position, and again discharged with the required velocity without muscular effort on the part of an attendant, and that, thereby, a substantial saving in both time and labor is effected. The average rate at which cars, each carrying 1 ton, can be stopped, steadied, weighed, and disposed of by this apparatus in the manner described is six per minute, or, more accurately, one car per 9.58 sec. The time occupied in pushing a full or empty car of the same capacity into the cage, and thereby discharging the empty or full car in front of it, is about 3 seconds.

### Lubrication.

The proper lubrication of mine-car wheels and machine parts at a colliery is a most important consideration, and it is probable that few other individual factors so directly affect the cost of production per ton. It is not logical to economize in the various small items of operation and neglect so important an action as the proper lubrication of cars and machinery. One authority claims that about one-half the power expended in mill or mine is lost in overcoming the friction of lubricated surfaces. He also adds that by changing from a poor to a good lubricant the loss is cut to one-fourth the power expended.

It is impossible to give any fixed rules regulating the selection of a proper oil for mine lubrication; however, it is generally believed that a dark-colored oil is of greater value than one that has been filtered to a red or yellowish color, for the process of filtration is not only expensive, but removes a considerable percentage of the lubricating value. Oil of a free-running nature is best for engine bearings, as it reaches the parts more quickly than oil of a sluggish nature. Where the bearings are open and the oil is applied direct, oil of a viscid nature is more suitable.

The waste incurred in the lubrication of mine cars is hard to avoid when old-fashioned car axles are employed, and this fact makes the buyer hesitate before adopting an expensive oil. Such action is not economy after all, and although some expense is incurred when mine cars are equipped with a self-oiling arrangement, where the oil is supplied from a reservoir in the axle or better still in the web of the wheel, still the eventual saving in power and decrease in wear and waste will more than balance any expenditure.

An arc of 250 amperes and 90 to 100 volts is now successfully used for cutting structural steel.

### The Use of Telephones in Coal Mines.

No well-organized coal mine can afford to be without a telephone system, even though the operations are comparatively small. Many mines have installed systems in which only three telephones are in use. The cost of constructing a line underground is usually less than outside, due to the fact that no poles are required, and there are no holes to dig. The wire can be supported from the roof, using porcelain or glass insulators.

In designing a telephone for mine use, there must be a full realization of the severe conditions to which such a telephone is constantly exposed, and certain requirements in design are necessary. The apparatus needed for the operation of the instrument should be mounted in a heavy cast-iron box, which is treated with some insulating compound that effectively preserves it from weather, dampness, and the acid fumes present in mines. The door of this case should close against a rubber gasket rendering the inside arrangement free from outside disturbances. Each telephone should be equipped with a standard long-distance transmitter and receiver, a powerful hand generator induction coil, and two dry battery cells. There should be a dome in the upper part of the case, having an opening on each side, so that the bell may be mounted there, and can be heard at some distance from the telephone.

All wiring of the instrument should be rubber covered, and the joints soldered. The induction and receiver coils are improved by boiling in a moisture-proof shellac varnish, and afterward baked, rendering them moisture-proof. The transmitter should be supported between four posts held in place by coiled springs to prevent it from picking up any outside noise or vibrations. A small cap containing the line-binding posts may be fastened to the bottom of the case. Line wires for same can be led out through an iron pipe screwed into the cap.

It would require much time and space to enumerate the many advantages accruing from the use of telephones in mines; however, the principal benefit derived is undoubtedly in the case of accidents, whether they be to the working machinery or to individuals. Nothing gives the superintendent of a mine so complete control over all parts of the workings as a connecting system of telephones.

A limited amount of coal mining has been carried on both in Alaska and Yukon Territories. Coal mined in a frozen condition crumbles after thawing. It is of inferior quality in the far north, and in common with the country rocks is greatly shattered, seemingly by pressure. Thawing of the ice content in its numerous cracks causes slacking.

\*Paper read before the North of England Institute of Mining and Mechanical Engineers, Aug. 4, 1906.

### Wooden Pipe in Coal Mines.

Wooden pipes have been used for centuries as conductors of water, and notwithstanding the great advance made in the improved manufacture of iron pipes, there are certain conditions under which wooden pipes give the most satisfactory results. It is generally known that sulphur and other impurities in mine water have no effect upon wood, while if it is desired to convey spring or mineral water, the wooden pipe has the advantage of not tainting the water with rust or poisonous lead.

Those familiar with the use of wooden pipes claim that selected white pine, free from sap and imperfections, is the best wood from which to manufacture pipe. These same authorities, after pointing out the lasting qualities of wood when kept thoroughly wet, continue by calling attention to the fact that the coefficient of resistance is lower in wood than in metal pipe, and remains less, gradually decreasing with time, while on the contrary it increases in metal pipe. It is an accepted fact that wood pipe is not affected by electrical action; it is impervious to acid conditions of soil, and to rust and corrosion.

The increased use of wood pipes by many large coal companies goes to prove that pipes of this kind are specially adapted for certain kinds of work. The pipes may be had from 1 to 20 in. bore, and in lengths from 4 to 8 ft. Winding the pipe with wire or steel hoops will enable it to withstand a pressure of 400 ft. head or 160 lb. to the sq. in. The steel hoops, before being wound on the pipes, are passed through a preparation of cement, which thoroughly coats the hoops and prevents them from being corroded by impurities from the liquid conveyed, which, in time, would work through the wood and destroy the hoop. The nearness of the bands to each other and the weight of the steel hoops are regulated by the pressure the pipe is to sustain. These bands are wound upon the wood under great tension, and a socket and tension joint is used. When the pipe is wound with copper wire, it is practically indestructible. In recent years wood pipe has been made of hard maple to withstand a pressure of 160 lb. per sq. in. This type is used particularly for conveying gritty culm and other rough substances which quickly ruin iron pipe. Actual experience proves that a line of maple will last ten times as long as one of iron. The action of the grit in running through maple produces a perfectly smooth surface, polished like glass, which does not resist the rush of the material through the pipe. Wood pipe is cheaper than iron, and weighing less, does not cost so much to transport.

About 23 per cent. of the coke produced in the United States during last year was from by-product ovens.

### Coal Mining in South Africa.

At the present time the carboniferous deposits of South Africa are known to have a combined area of over 56,000 square miles, which estimate will be greatly increased when later discoveries are made, for coal is found practically all over South Africa above a certain altitude.

The known deposits lie for the most part at a depth of not more than 500 ft. from the surface, and are easily worked, while the seams range from 10 ft. to 20 ft. in thickness. The most important coal producer of the South African colonies is the Transvaal. In this colony the coal is worked at extremely shallow depths. Where the ground is hard, no lining is used in the shafts, while in soft strata pitch pine is employed as a lining. The shafts are generally rectangular, and as the law does not compel the sinking of two shafts, it is common to find one shaft divided into four compartments and answering for all purposes.

The measures are generally free from faults and dislocations, but are subject to intrusion of igneous dikes (whinstone and dolerite), sometimes 1000 to 1500 ft. wide, but not perhaps to the same extent as the seams in Natal. The igneous dikes have no perceptible effect upon the general lie of the seams, but the quality of the coal changes within a certain radius.

An average analysis of the coal in this field shows 62 per cent. fixed carbon; 15.1 per cent. volatile matter; 0.6 per cent. moisture; 0.3 per cent. sulphur; and 22 per cent. ash. The coal is dull, of splinty appearance, weathers badly, and is liable to spontaneous combustion. Little or no timber is required, hardly any water is encountered, and fire-damp is practically unknown.

To sum up briefly the coal situation in South Africa, it may be stated that the seams vary from 30 in. to 40 ft. in thickness and from 5 to 25 per cent. in ash. There are 22 collieries in active operation with a nominal capital of nearly \$25,000,000. Out of the 14 producing companies, four are paying dividends, the average rate being equal to 11.19 per cent. on the issued capital.

### Spontaneous Combustion

In averting spontaneous combustion where piles of bituminous coal are stored, an excellent scheme is to drive an iron or steel bar into the mass and allow it to remain until it has reached the temperature of the coal in which it is embedded. A touch of the hand will then indicate whether the heat is sufficient to cause ignition or not. The precautions necessary to avoid overheating the coal pile are: Never heap up damp coal; always keep it in steel or concrete bins, and never near the boilers. The pile should not be more than 11½ ft. deep, and a free circulation of air around and beneath when possible. If

overheating and ignition does take place, the pile should be dug away and turned. Throwing on water is of little use, since if it penetrates into the mass it will only aggravate the difficulty. If the coal cannot be turned, and the fire is in the center, it is a good idea to drive large perforated pipes down into the mass, and then force a current of water down through them, which will quickly extinguish the fire.

### The Warrior Run Colliery Fire.

BY M. S. HACHITA.\*

The fire at the Warrior Run anthracite colliery started after a squeeze which extended to the surface. Through the openings made by the caving, the mine gases escaped, and in one place collected in a cellar of one of the houses, afterward exploding and killing a woman besides burning her brother. The house was demolished. The mine foreman becoming alarmed, ordered all miners and laborers out of the workings, with the result that only one of the 250 men in the mine was killed. This single accident would not have occurred had orders been obeyed.

The cause of the fire is unknown; in fact the company officials did not know there was a fire until four days after the squeeze occurred, as no one was allowed to go in the mine. An analysis of the mine air at this stage revealed the existence of a fire, and showed a composition as follows: CO<sub>2</sub>, 2 to 3½ per cent.; O<sub>2</sub>, 15 to 16½ per cent.; CH<sub>4</sub>, 2 to 4 per cent.; internal temperature rose from 70 to 88 deg. F. All these tests were made under normal quantity of air supply through the intake. The first action the mine authorities now took was to diminish the speed of the fan, which immediately caused the O<sub>2</sub> to diminish and the CO<sub>2</sub> to increase. It was then decided to stop the fan and both the intake and exhaust airways were sealed. Water was allowed to go into the mine at the rate of 2000 gal. per min., through a 6-in. pipe line. An analysis of the mine air at present shows CO<sub>2</sub>, 4½ per cent.; O<sub>2</sub>, 1½ per cent.; CH<sub>4</sub>, 35 per cent.; water-gage, 1 in. forcing out, and temperature 39 deg. F. inside. The fire is now thought to be extinguished and an investigation will soon be made.

Spontaneous cracks in cold soft steel are still not wholly explained. When such cracks occur in hard and hardened steels or in cast irons which have practically no ductility they are easier to understand, though even in such cases just what was the "last straw" which caused the rupture is not usually apparent. This is on the assumption that the composition of the steel is suitable, particularly as regards phosphorous and oxygen, which must not be present in too great proportions, and further that the steel was well cast and rolled or forged.

\*District engineer, Lehigh Valley Coal Company, Wilkes-Barre, Penn.



### Colliery Notes.

In roughly calculating the cost of hauling, hoisting, or driving machinery at a mine, it may be generally assumed that a boiler horse-power is worth about \$50 per year.

Any oil that is the product or by-product of rosin is always smoky and should not be used in miners' lamps. Only a pure animal or vegetable oil should ever be allowed and should be tested at 60 deg. F. The specific gravity of the oil must not exceed 24 deg. Tagliabue.

Every cage on which persons are carried should be fitted with iron bars or rings in proper places and in sufficient numbers to furnish a secure hand-hold for every person permitted to ride thereon. No provision for the safety of miners is more neglected than this.

At the bottom of every shaft, and at every caging place, a safe and commodious passageway should be cut around said landing place to serve as a traveling way by which men or animals may pass from one side of the shaft to the other without passing under or on the cage.

The coke yield of the beehive ovens in the Pocahontas region of West Virginia varies from 55 to 65 per cent. of the coal coked. The same coal, which contains only 15 to 20 per cent. volatile carbon, gave a yield of 84 per cent. when tried as an experiment in by-product ovens.

Cages on which men are riding should not be lifted or lowered at a rate of speed greater than 600 ft. per minute. No person should be allowed to carry any tools, timber or other materials with him on a cage in motion, except for use in repairing the shaft, and no one should ride on a cage containing either a loaded or empty car.

The American-Norwegian expedition, to develop deposits of coal in Spitzbergen, has just returned. It considers the future of coal mining there to be promising. The quality of the coal discovered by boring is much superior to that first opened, and the company intends to develop the mines and have them in active operation as soon as possible.

Any building erected for the purpose of housing the hoisting engine or boilers at any shaft should be built substantially fire-proof, and no boiler-house should be located nearer than 60 ft. to the main shaft or opening. Nor should such a building be located near any inflammable structure. Many lives may depend on the ever proper action of the hoisting engines.

In every mine, whether worked by shaft or drift, there should be provided and maintained, in addition to the hoisting shaft or other place of delivery, a separate escapement shaft or opening to the surface, or an underground communicating passageway between such mine and some other contiguous mine, such as shall con-

stitute two distinct and available means of egress to all persons employed in the mine.

The use of clay brick for crowns in coke ovens is fast being abandoned, the silica brick having proved its superiority. One operator, whose experience extends over a period of many years, estimates the life of a silica crown at from 12 to 15 years. Some clay crowns have lasted that long, but the instances are rare. The average life of the clay crown is probably less than three years.

Gas made in by-product coke ovens can be conveyed further than is generally believed. At one plant the gas is carried 38 miles under a pressure of 12 lb. without any material leakage. The average candle-power has been 18.07, and it has run as high as 25. There is no deposit from it. Magnesite brick have been tried in four of these by-product ovens, but were found too expensive. Calorized brick were formerly used, but have been replaced by slag brick ground to a uniform thickness. These bricks give little trouble from expansion.

In determining the details of a ventilating system, there is often much discussion concerning the volumetric efficiency of fans. Much data has been collected and published, but invariably these statements have left out one of the most essential factors, viz., the water-gage, or resistance against which the fan works. Without the water-gage it is impossible to know the foot-pounds of energy that is delivered by the fan. It is interesting to know how fast a fan will pass the air entering it, that is, the volumetric efficiency, but it is a minor consideration as compared with the mechanical efficiency.

It is remarkable that the standard coking coal of the Connellsville region is found in a long, narrow, synclinal strip, west of the Chestnut ridge. It affords a coal with an average chemical composition between the rather dry coals to the eastward of it and the too bituminous coals to the westward. Although there are cases where for some unknown reason one coal will fuse in the coke oven and make good coke, while another coal of similar chemical composition will not fuse in coking, however, as a general rule it may be considered that coals approximately equal in chemical composition will afford similar results in the process of coking.

A boiler when properly handled should be blown off and cleaned at regular intervals. It is not sufficient to depend on the partial blowing off of the boiler, which is the practice often employed. By this latter method only a portion of the sediment and very little of the accumulating scale are removed. Water should be fed into the boiler in small quantities at regular intervals, and the water level should not be allowed to fall so low that it will not appear in the lower gage-cock when that is opened. The glass water-gage

should be frequently tested to see that it is not clogged, which often happens when impure water is used. Forcing a boiler by urging the fire should not be done, as it can only result in injury.

In no case should the workings of any mine be allowed to encroach on the barrier pillars preserving the boundary lines of the mine, except for the purpose of establishing an underground communication between contiguous mines, as is often prescribed by law. Such openings must be only large enough for a man to crawl through and should be stopped with much care. In fact, it is a serious question whether the benefits to be derived ever justify the driving of holes to connect adjacent mines. In approaching old workings, where dangerous accumulations of water or gas may exist, the operator should see that all advance work is driven narrow, and that bore-holes are maintained at least 20 ft. in advance of the face of the work.

The greatest care must be exercised in heating newly built coke-ovens for the first time. The heating agent in this case should be wood, or coke-firing in the ovens themselves, or they may be heated by gas supplied from some other source. If care is not observed in heating the brickwork to a proper coking temperature, there will be a too rapid expansion, which is likely to distort the alinement of the ovens, or produce cracks through which, either heat will escape, or air enter, which is detrimental to the economical operation of the ovens. After the heating process has been concluded, coal is charged into the ovens according to a regular schedule, great care being exercised not to charge too rapidly in order to avoid the chilling off of the primary heats.

When deep shafts are necessary to reach the coal seam it is economical to hoist heavier loads at an increased speed. This has led to the use of four-cylinder compound engines, which in spite of unfavorable factors are meeting with much favor. In such engines a condenser should be attached, and as it acts on the larger cylinder the power will be proportionally increased. Not only does the condenser reduce back pressure, but it permits the more complete utilization of the expansive force of the steam. If a condenser is not employed, the final pressure in the low-pressure cylinder must be considerably greater than that of the atmosphere, in order to obtain a free and rapid exhaust. A high initial steam pressure is essential and some form of expansion gear should come into operation and be so arranged as to produce a low terminal pressure. The engine exerts twice as many foot-pounds of work in the first 10 strokes as it does in the succeeding 10. It is evident, therefore, that unless acceleration is to proceed, the engine driver must either throttle the steam or expansion must take place.

### Metallics.

A heavy expense in conducting the asphalt business is the price of barrels for containing the product. No cheap substitute has yet been found.

Most of the oil asphaltum made in California is a by-product from the distillation of lubricating and illuminating oils and lighter products from crude petroleum, which has an asphaltic base.

Internal strains in iron and steel are the result of stresses within the mass of the piece, some parts being in tension and some in compression, each part striving to relieve itself from strain and make the piece assume a form in which all parts are at rest.

R. S. Woodward has computed that, assuming the average density of the earth's crust to be 2.75, the density at the center is 10.74, and at 100 miles depth it is 3.03. Owing to the rigidity of the rocks, no increase in density is manifest above a depth of five miles.

Calumet and Hecla copper is particularly free from natural impurities, showing 99.89 per cent. of copper; 0.1 per cent. of oxygen; and 0.01 per cent. of iron and arsenic. Its electric conductivity, when drawn to 0.104-in. diameter, as 99.5 to 100 Mathiesson standard.

Aluminum bronzes containing less than 4 per cent. aluminum are easily worked, but beyond that point the bronze becomes hard to work. Such a bronze can be rolled, but wire cannot be drawn from it. With 6 per cent. and over of aluminum the metal cannot even be rolled.

Pure gypsum contains 79.1 per cent. of calcium sulphate and 20.9 per cent. of water. Deposits of gypsum large enough to be worked for plaster are, however, rarely even approximately as pure as this. Gypsum used for plaster usually carries varying, and often high, percentages of clay, limestone, dolomite, iron oxide, etc.

When alloyed with copper, aluminum acts similarly to zinc, but much more strongly, so that an addition of 1 per cent. aluminum produces as much effect as 3.5 per cent. of zinc. Aluminum bronzes are much stronger than ordinary bronzes, but those containing 10 per cent. or more of aluminum are so hard that they cannot be worked.

Portland cement made in the United States is formed from four combinations of materials: Argillaceous limestone and pure limestone; marl and clay; chalk and clay; hard limestone and clay or shale. More than half of the total portland cement of the United States is now made from the first-mentioned pair, but that from the last mentioned group is rapidly increasing.

Yellow metal containing 60 per cent. copper and 40 per cent. zinc shows the well known color. A trace of aluminum added to this gives it a golden color,

which continues until 5 per cent. aluminum has been added. Between 5 and 7 per cent. aluminum the alloy becomes rose colored, and when 10 per cent. has been added, the color becomes silver white.

A bronze containing 92 per cent. copper and 8 per cent. tin will have its ultimate strength and elongation increased somewhat when heated to 500 deg. C., and suddenly cooled by plunging into water. Alloys containing less than 92 per cent. copper increase rapidly in tensile strength and elongation with tempering above 500 deg., reaching the maximum strength and elasticity at 600 deg. followed by quenching.

Tantalum minerals have been found, possibly in commercial quantities, at three places in the United States: In a feldspar quarry at Henryton, Md.; in a feldspar quarry near Glastonbury, Conn., and at Tinton, S. Dak. The mineral at the first mentioned place carries 38.19 per cent. of tantalic oxide, and that at the last contains 44 per cent. of tantalic oxide. Both specimens also contain considerable amounts of niobic oxide.

Manganese acts upon steel in a peculiar manner. When the steel contains 4.5 per cent. of this element, it is more brittle than cast iron, in spite of the low-carbon content. However, when the manganese increases to about 12 per cent., the steel becomes entirely different. When forged and treated, the steel has a tensile strength of about 120,000 lb. per sq. in., and a ductility of between 40 and 50 per cent. And yet manganese, the determining factor, is, itself, very brittle.

Tin exceeding 2.5 per cent. will ruin the workable qualities of brass by making it hard and fragile. Manganese alloyed with copper produces a metal very similar to the ordinary zinc-copper brass. The manganese not only destroys oxides contained in the melted alloy, but also gives the metal certain mechanical properties. It increases the ultimate strength and elastic limit, but decreases the elongation. Above 4 per cent. manganese, brittleness increases, but hardness is not changed.

There are four regions in the United States in which diamonds have been found: The Pacific Coast, along the western base of the Sierra Nevada; in the terminal moraine through Wisconsin, Michigan, Indiana and Ohio; Kentucky and Tennessee; the Atlantic States from Virginia to Alabama, along the eastern base of the Appalachians. The actual place of origin of the diamonds in all these cases is unknown, as all have been found in loose superficial deposits, and all accidentally.

Carbon dioxide is obtained from the roasting of magnesite, from the treatment of magnesite or limestone with sulphuric acid, by saving the gases given out in brewing, or from burning coke, or by collecting the gas given out by natural spring

waters. The principal uses of carbon dioxide are in the manufacture of beverages, for extinguishing fires, for use in refrigerating plants, for the treatment of logwood for the extraction of its dye, and for the mechanical operation of railroad block systems.

The phosphate rock of Florida has been classified under four varieties: Hard rock, containing 80 per cent. phosphate of lime; soft rock averaging 50 per cent. phosphate of lime; land pebble averaging 70 per cent. phosphate of lime, and river pebble ranging between 45 and 61 per cent. phosphate of lime, according to its locality. The first two varieties are intimately associated, and not too much attention has lately been paid to the soft rock. The origin of the Florida phosphate has given rise to much discussion, and is not yet fully understood.

The native mass copper of Lake Superior has the highest electric conductivity of any known copper. A sample cut from the most compact portion of a mass, rolled and drawn into a wire of 0.104 in. diameter and annealed, gave a conductivity of 102.5 Mathiesson standard. Cathode copper, carefully deposited with a low current, and prepared in the same way, gave just as high a conductivity. Copper, in either of these forms, has a more crystalline structure than even the best Lake copper, whose conductivity approaches 100, Mathiesson standard.

At the earth's surface, the acceleration due to gravity averages 32.2 ft. per second. At points below the surface this acceleration increases, up to a depth of 610 miles, where it has its maximum at 33.3 ft. per second per second. That is, a mass would have its greatest weight at this depth. Approaching the center of the earth, the acceleration then decreases, owing to the opposing attraction of the outer part of the earth. At a depth of 2000 miles, acceleration of gravity is reduced to only 26.8 ft. per second per second, or less than at the surface. At the center, of course, the attraction of gravity, and therefore the acceleration due to it, vanishes.

A gasolene railway motor car, designed by Hugh Mathews and W. F. Davis, has recently been operated experimentally on the Missouri, Kansas & Texas Railway. The car is carried on two four-wheel trucks, one of which is the motor or driving truck, but with only one driving axle. An eight-cylinder horizontal engine of 170 h.p. is used, and it is stated that no variable-speed gears are used, the speed being controlled entirely by the throttle. Large spur wheels on a shaft driven by the engine have connecting or coupling rods attached to these wheels, and to the rear wheels of the truck. The spur wheel also drives a pinion on the cam shaft of the valve gear. Power is applied or released by means of cone clutches. The car is 60 ft. long, and the total weight is 75,000 lb.



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\*Illustrated.

### The Labor Situation.

As we forecasted several months ago, the Government has been obliged finally to resort to Chinese labor for the construction of the Panama canal, and bids have already been asked for the delivery of 2500 coolies on or before Jan. 7, 1907, with the right to call for 2000 per month additional, after four months' notice, if the experiment should prove successful. The specifications have been carefully drawn and ought to eliminate careless talk about "slavery," but, after all, they are not materially different from the conditions under which the coolies were imported into South Africa. The radical difference between the two undertakings is, of course, that in one case the contract was made by private companies for their own benefit, while in the other case it is being made directly by a responsible Government for an international work of extraordinary importance. The terms which have been prescribed by the Canal Commission conserve the rights of the coolies and even respect their native customs and prejudices. Those who come will undoubtedly improve their condition; even in South Africa they appear to have been satisfied in that respect, judging by the insignificant number which took advantage of the repatriation offer.

The project of employing Chinese on the canal has been contested by the labor unions of America, just as the presence of the coolies in the Transvaal was protested by the labor unions of Great Britain, but in neither case does their opposition rest upon any practical ground. On the contrary, the operation of the mines in one case and the execution of the great engineering work in the other create a distinct advantage to the skilled laborers who remain at home through the increased demand for the things they make. The Americans who are capable only of rough work do not want to go to Panama. Aside from disinclination to go to a region of disagreeable conditions, there is too great a demand for them at home to permit any thought of emigration. Whatever may be done at Panama can have no unfavorable effect on the standing of organized labor in the United States, and it will be a damage to its interests if it persists in challenging the means of dealing with an emergency.

The fact is that the shortage of the supply of labor, both skilled and unskilled,

is perhaps the greatest industrial problem of the present time. There is an enormous demand for commodities of all kinds and insufficient means for producing the commensurate supply. There are immense projects halting along, or postponed indefinitely, because of inability to secure the men to do the work. To mention merely a few instances, the copper mines of large resources in Arizona, Michigan and Montana are unable to increase their output further because they can not get men. Several large projects of the reclamation service of the U. S. Geological Survey have had to be deferred for the same reason. Some of the railways have been obliged to increase the age limit in order to obtain the men necessary to handle the rapidly increasing traffic. Wages in almost all branches have been materially increased, but nevertheless the shortage continues, and this condition exists in all parts of the United States. Truly, no one who wants to work need now be idle. A recent report of the Department of Commerce and Labor shows statistically that although the cost of living has increased to a high degree, the earnings of labor have increased in slightly greater proportion. The situation as to labor is, we believe, the strongest feature in the present industrial activity, because it is unusual for the demand for human service so much to exceed the supply.

### Smelting Zinc Ore in the Blast Furnace.

The experiments on the smelting of zinc ore in the blast furnace by the Lungwitz process at Warren, N. H., are shortly to be resumed and this season will be pushed to a definite conclusion, one way or another. It will be remembered that the physics of the process were recently discussed in two elaborate papers in the JOURNAL by Mr. Gordon, chief engineer of the company which is testing the process. However, there are so many physico-chemical conditions involved in this problem as to which there are no available data, that it is impossible to arrive at any absolute conclusion from theoretical considerations, and the result must be determined by trial on a practical scale. Last year the work was unfortunately checked by a series of untoward accidents, which however were not unexpected in view of the boldness of the conception and entire novelty of the plant.

### Where the Responsibility Lies.

Everyone familiar with mine development will concede that such work is accompanied by grave dangers. This condition has made it necessary for the State legislatures to enact stringent laws to govern mining operations. The various State mine inspectors are urging the passage of new laws, and with good reason. However, there is another side to the question that is not generally considered by those who sympathize with the miner. Every operator and mine manager should be held closely responsible for any violation of existing laws, and when found guilty should receive personal punishment. But, let those who are considering this question not throw all the blame upon the management, and ignore the responsibility of the employee. To point out the latter it is necessary only to call attention to the many accidents resulting from the negligence of the miner, or his wilful disregard of the carefully prescribed rules intended to insure his safety.

There is a general opinion among colliery engineers that the number of mining accidents is too great and should be reduced. The remedy most often suggested is stricter legislation and a more rigid enforcement of the law. This, however, will not accomplish the desired result, unless the mine managers themselves require strict observance on the part of the foremen, and the latter compel absolute obedience by the miners. If in conjunction with such a policy the miners unions will strongly support the mine authorities in their attitude, recognizing the fact that criminal neglect on the part of their members should be punished, we will begin to approach the matter in an effective way.

One mine inspector states that 24 out of 48 non-fatal explosions in his district were caused by miners acting in direct contravention of regulations. Another instance shows that 47 injuries were suffered by workmen who were careless with regard to retiring to a place of safety during shot-firing. In West Virginia alone, during 1905, there were 14 fatalities resulting from the mishandling of powder and dynamite. Six men were seriously injured by premature blasts or the excessive use of dynamite, while many other accidents were caused by carelessness in handling lights, approaching gas, etc. In nearly all cases, innocent persons suffer with the reckless and in a way pay the

price of his neglect. Such being the case, it is reasonable to believe that nothing will more effectually tend to lessen mine accidents than the effective education of the miners themselves.

Mining camps are generally devoid of amusements or attractions that engage the interest of the men at night, and this would make it easy for any manager to improve the condition of his miners, and increase the safety and efficiency of the work, to assemble them one evening a week, to receive instruction as to the dangers of mining and the laws and precautionary matters that are intended to make the work less dangerous and more pleasant. We have no doubt that such action on the part of the mine operators would be rewarded by more than a philanthropic sense of duty performed.

### The American Mining Congress.

The American Mining Congress will hold its annual meeting at Denver, Colo., Oct. 16 to 19, inclusive. It will doubtless be a well attended meeting, Denver being an attractive and highly convenient center. The program committee has decided to set apart one session for discussion and action upon the report of the Mine Drainage Committee, which has in hand the work of preparing an act legalizing the creation of mine drainage districts, similar to public improvement districts in cities and towns. Another session will be devoted to final action upon a law to be prepared by the committee looking to the punishment and prevention of mining frauds. It is proposed to draft laws to that end for presentation to the various State legislatures at their next session, and take proper steps to urge their enactment. It is contemplated that there will also be some discussion upon the question of damages from smelter fumes, which has been a troublesome one in several important districts.

These are matters which can properly be taken up by the Congress, and as the latter develops there will be other matters pertaining to the general welfare of the mining industry, which may usefully be entered into. The American Mining Congress, as an organization representing the industrial interests of mining and metallurgy, furnishes an effective means for learning the sentiment of a large body of mining men as to public questions which affect their business. It is fitting that

there should be such an organization in the mining industry, as there are many similar ones in other industries, and the Congress has our best wishes for a growth that will enable it to accomplish valuable results. It is to be hoped that the forthcoming meeting will be well attended, so that it may be thoroughly representative. Not the least of the benefits which it may accomplish is the opportunity which it affords mining men to meet and compare notes.

### Coal Mine Pillars.

In the room-and-pillar method of coal mining, it is so essential to insure the main air and passage ways against the slightest chance of interruption that the chain and barrier pillars left for their protection are usually several times as thick as is absolutely required, and in some States their least dimensions are fixed by law. But, to determine the best width to give a pillar between adjacent rooms, having due regard to the workmen's safety as well as to pecuniary economy, is a problem that involves the nice balancing of many considerations.

Two of the controlling elements are the facts that pillars must be robbed by hand, and that pillar coal is more friable than room coal. Pillars must, of course, have sufficient crushing strength to support the roof over an area sufficiently wide to permit regular progress, but, under given conditions of roof pressure and firmness of floor, the wider the rooms whose breasts can be undercut by machine, the narrower is the pillar left to be drawn by the more expensive hand work.

Pillar drawing, risky enough as it is, absolutely precludes the use of chain undercutters, while even an air puncher would hinder the precipitate escape of its runner when the coal started to break.

Coal that is left standing under the concentrated weight of the roof, and surrounded by air currents, slowly loses some of its volatile combustible, while at the same time it undergoes a cracking and disintegration fatal to its salability as lump coal. This objection, however, loses all its force in the case of a bituminous mine whose output goes to coke ovens, while the growing use of automatically stoked fine fuel removes some of the abhorrence of slack even in non-coking coal.



## Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor. We do not hold ourselves responsible for the opinions expressed by correspondents.

## Magic in Mining.

Sir—It is with combined feelings of amusement, wonder and regret at the credulity of the Government and the hydraulic miners of the Yukon that the return of the Hatfields is to be noted. They went to the Klondike ostensibly to charm Jupiter Pluvius into a generous mood by mystic incantations "in a cloth covered cabinet (which no one was permitted to enter)" and thus produce a copious rainfall during the dry summer months. Much rain would mean much hydraulicking and a consequent large output of gold; hence, the \$10,000 which they were to receive as an honorarium if success crowned their efforts, was to be paid share and share alike by the hydraulic miners and the territorial government.

The Klondikers had commonly been supposed to be sturdy, resourceful and ingenious. They have won a magnificent production against the tremendous odds of a rigorous climate and hostile environment. They have tried a large number of devices, many of them mechanical monstrosities, to be sure, but others, like the steam thawer, wonderfully well adapted to combatting successfully obstacles of colossal magnitude. In view of their previous record for common sense, it is the more remarkable to observe a procedure that smacks of witchcraft and quackery, sanctioned by the Government acts and approved by a magnificent body of the most practical of men.

The Klondikers have had a severe and costly lesson (the Hatfields have had all their expenses paid by the Government, and no doubt enjoyed a delightful outing in the beautiful arctic summer) and it is hoped that we shall not need to chronicle other instances of such misguided enthusiasm.

However, the situation has another aspect, a serious one. There are large volumes of material in Klondike only workable with the assistance of capital. It is to be feared that when capitalists shall be approached with meritorious propositions, this rain-making farce will be quoted as a criterion of Klondike judgment and veracity. It is likely that some of the large corporations, now engaged in installing machinery costing millions of dollars in the Klondike, are wondering if there is not a large amount of "rain-making" sprinkled through the reports which interested them

H. J. P.

San Francisco, Cal., Aug. 21, 1906.

## New Publications.

"Notes on Metallurgical Mill Construction." Edited by W. R. Ingalls. Pp. 256; illustrated. 6x9½ in.; cloth, \$2. New York, 1906: ENGINEERING AND MINING JOURNAL.

Contents: Cost of earth work. Brick masonry. Sand-lime brick. Concrete mixture. Requirements for concrete. Limestone screenings for use in concrete. Rubble concrete. Concrete work about mines. Concrete foundations and floors. Design of mill buildings. Cost of a single-floor mill. Lighting of workshops. Lighting of mill buildings. Hollow brick for mill-building construction. New uses of concrete in building construction. Corrugated iron buildings. Iron and steel buildings. Notes on timber. Design of timber trusses. Saw-toothed roof construction. Notes on roofs and roof coverings. Protection of iron and steel. Protection of steel from corrosion. Specifications for painting steel structural work. Stamp-mill construction. Design of orebins and coal pockets. New changing-house at Cliffs Shaft mine. Dust-proof partitions. Capacities of Blake crushers. A cantilever battery frame. Battery foundations. Stamp tappets. Horse-power for ten-stamp battery. The dry crushing of ore. Modern crushing and grinding machinery. Springs on crushing rolls. Notes on some regrinding machines. Regrinding machinery. The Ferraris ball-mill. The operation of a tube-mill. The theory of the tube-mill. Tube-mill notes. Tube-mills. Chilean mills. Ore drying. Notes on ore and coal drying. Grinding machines used at Kalgoorlie. Mechanical conveyors. Belt elevators. Tailings elevators. A system of handling sand mechanically for cyanide vats. Economy in mill water. Removal of sand from waste water. Disposition of tailings. Rubber and rubber belting. Coal-dust firing. Internally fired boilers. Accidents to motors and dynamos. Alloys for bearing purposes. Cost of small power plants. Construction of wooden water tanks. Pipeline construction. Transportation of gas by pipe lines. Making pipe joints.

This book is a reprint of a series of articles bearing upon some of the important details that enter into the construction of metallurgical plants, especially mills of various kinds, which have appeared in the ENGINEERING AND MINING JOURNAL, chiefly during the last three years; in a few cases articles from earlier issues have been inserted, in view of their special importance. These articles relate to a variety of subjects, which are of great importance in the design, construction, and operation of metallurgical mills, but have not been treated with any fullness in technical literature, save in the periodicals and transactions of the engineering societies, wherein they escape general availability. For this reason, it has been conceived to be useful to collect

and republish them, in this convenient form.

## Mineral Production of Spain.

The output of mineral and metal products in Spain for the past two years is officially reported, in metric tons, as in the subjoined tables. The production of fuels was as follows:

	1904.	1905.	Changes.
Anthracite.....	119,696	135,099	I. 16,003
Bituminous.....	2,903,671	3,067,826	I. 164,155
Lignite.....	100,773	168,994	I. 68,221
Total.....	3,123,540	3,371,919	I. 248,379

Of the most important metallic ores, the output was:

	1904.	1905.	Changes.
Copper ore.....	2,646,126	2,621,054	D. 25,072
Iron ore.....	7,964,748	9,077,245	I. 1,112,497
Manganese ore...	18,732	26,020	I. 7,288
Lead ore.....	93,230	105,113	I. 11,883
Quicksilver ore...	27,185	26,485	D. 700
Silver-lead ore....	177,104	160,381	D. 16,823
Silver hematite ore	122,109	152,027	D. 29,918
Zinc ore.....	156,329	160,567	I. 4,238

Other less important metallic ores were produced in the following quantities:

	1904.	1905.	Changes.
Antimony ore.....	245	77	D. 168
Arsenic ore.....	3,510	4,790	I. 1,280
Bismuth ore.....	5	14	I. 9
Cobalt ore.....	25	25	I. 0
Pyrite.....	161,841	179,079	I. 17,238
Silver ore.....	303	840	I. 537
Tin ore.....	299	209	D. 90
Tungsten ore.....	60	375	I. 315

A large part of the pyrite mined in Spain—most of it exported—is included in copper ore, as it carries some copper. The pyrite in the table above is only that which carries no copper.

In the final table we give the output of the lesser non-metallic minerals:

	1904.	1905.	Changes.
Amblygonite.....	90	120	I. 30
Asphalt.....	3,761	5,725	I. 1,964
Bituminous rock.....	100	750	I. 650
Barytes.....	453	290	D. 163
Graphite.....	30	15	D. 15
Kaolin.....	1,700	720	D. 980
Magnesite.....	1,129	1,446	I. 317
Phosphate rock....	3,505	1,370	D. 2,135
Salt.....	543,658	493,451	D. 50,207
Sulphur.....	40,389	38,153	D. 2,236

The total value of this production in 1905 was estimated at \$37,320,435. Statistics of metallurgical production in 1905 are not yet available. The principal metals smelted in Spain are zinc, copper, iron, lead and quicksilver. The total metallurgical output in 1904 was valued at \$44,166,631, which was probably largely exceeded by that of last year.

## Copper Queen Converters.

In our issue of August 18, in the description of the Copper Queen smelter, by D. E. Woodbridge, a typographical error caused the air capacity of the converter-blower plant to be greatly understated. The blowing plant contains six engines of which five have a capacity of 6500 cu.ft. per minute each, and the sixth has a capacity of 15,000 cu.ft. per minute, instead of 650 and 1500 cu.ft. respectively as stated.

### The Metallurgy of Copper in Chile.\*

BY A. GMEHLING.

The processes described in the following article include the roasting of copper matte, the utilization of the escaping gases for the production of sulphuric acid, and the extraction of copper from low-grade ores by the acid thus produced. The works, at which the process thus outlined is carried on, are situated at Guayacan, Chile.

Up to the year 1902 all the sulphuric acid used in the Chilean Republic was imported from Europe under a heavy duty, and it cost between 12 and 14c. per lb. At such a cost for acid, it was quite out of the question to attempt the leaching of low-grade copper ores, of which there are extensive deposits in Chile. These are mostly poor, silicious copper ores, carrying from 2 to 5 per cent. copper, but are very easily obtained by surface workings.

In 1900 I was commissioned by the Chilean Society to study in detail the process of producing sulphuric acid by the catalysis of sulphur dioxide to trioxide. After extended investigation I went to Chile with a corps of assistants and commenced the erection of a plant which was put in operation Feb. 11, 1902. As the freight and the customs duty on the equipment were exceedingly high, and as the interest on the capital is large (10 per cent.), it is not to be expected that sulphuric acid can be produced as cheaply as in Europe. At present the selling price is 5c. (Chilean gold) per lb., but it will be less as soon as the consumption warrants a production of more than 14,000 lb. per day.

The material to be roasted is copper matte, purchased from the various smelters of the country, and is very pure. The usual elements present are copper, iron, sulphur and small amounts of manganese. All the mattes contain silver and gold, but only a very few contain such impurities as arsenic, antimony, bismuth, lead, or nickel.

Upon its arrival at the works, the matte is crushed in rolls to a size ranging from 1.5 to 3 mm. A few assays of matte samples give the following results:

Copper.....	40-50 per cent.
Sulphur.....	22-27 per cent.
Iron.....	23-30 per cent.
Silver.....	150 grams per metric ton.
Gold.....	5 grams per metric ton.

The roasting of the crushed matte is carried out in Rhenania muffle furnaces.

These furnaces require very little coal, but, on the other hand, they need close attention owing to the absolute necessity for the frequent breaking up of the charge. Usually a week is required to bring a furnace up to regular running. Each muffle holds about 3000 kg. of matte,

\*Abstract from *Oester. Zeit.*, Feb. 10 and 18, 1906.

so that the total capacity of a furnace is about 36 metric tons. During every 24 hours there are charged 16 portions of 780 kg. of matte each, and a like quantity of roasted product is withdrawn. The matte remains 36 hours in the furnace. Therefore, during 24 hours, a block roasts 12,000 kg. of matte and requires only 250 to 300 kg. of coal.

The upper muffle is the hottest and the matte kindles quickly. Hence, after each charging, a strong evolution of gas takes place, and the greatest part of the sulphur is oxidized. Here also the greatest pains must be taken to prevent fusion of the matte. On account of the quickness with which the sulphur oxidizes, the amount of SO<sub>2</sub> contained in the roast gases varies considerably. Immediately after charging, the SO<sub>2</sub> reaches as much as 4 or 5 per cent., but during a regular running it is seldom over 3 per cent. In roasting, the matte increases in volume; a cubic meter of raw matte weighs 2900 kg. while the same volume of roasted product weighs only about 2150 kg. The sulphur contents of the roasted product varies from 2 to 4 per cent.

The plant in question has two blocks of furnaces but at present uses the roast gases from only one block for the production of sulphuric acid. In round figures, the one block produced in the last year 30,000 cu.m. of gas per 24 hours. Of this quantity, every 2500 cu.m. yielded 0.583 ton of commercial acid of 65.85 deg. B. At present there is no inducement to convert all of the gas to acid. It is hoped, however, that the extended use of the sulphuric acid for leaching ores, making nitroglycerin, and other uses, will create a much larger demand for acid, which the plant is abundantly able to supply.

The roasted copper matte is delivered to the smelters of the district and is smelted there with the addition of silicious oxide ores, rich slag, and coke. Crude copper running 97 to 98 per cent. is thus produced. Part of the copper, which runs only 80 per cent., is given a roast-smelt in a reverberatory furnace and yields copper of great purity, which goes under the name of "Chilean Standard Ingots"; these seldom fall below 99.95 per cent. copper. Such reverberatory furnaces hold about a 6-ton charge and require about 6 hours to smelt it. A modern smelting plant would undoubtedly reduce the cost of the copper from that involved by the unecconomical and laborious method of smelting just described. The greatest part of the copper produced is shipped to North America, where it is melted down with other copper, carrying silver and gold, and it is electrolyzed.

The roast gases are drawn out of the dust chamber and are forced onward by an Encksen gas pump. When the plant was first set up, the hot gases (230 deg. C.) were sent from the dust chamber directly into a walled passage whose floor was lined with lead plates 5 mm. thick,

and thence into a lead conduit 4 mm. thick, leading to the purifying towers. Both of these conduits had to be abandoned, as, after four to six months, the lead conduit was reduced to a thickness of only 1.5 mm. and needed to be renewed. The chief cause of the destruction of the lead was the presence of hydrochloric acid vapors in the roast gases. The replacing of the lead conduits by cast-iron ones removed the difficulty in question. These iron conductors have now been in use for a year and show but very little wear. Moreover, in the old conductors, the air that leaked in through the walls of the canal, coming in contact with the hot gases, together with the catalyzing action of the porous brickwork, produced a dilute sulphuric acid (50 to 60 deg. B.) in the canal. Although this acid was constantly removed, it gave rise to considerable loss. Its constant removal is also very necessary under present conditions in order to prevent the corrosion of the cast-iron conductors.

For the application of the process of catalysis, it is necessary that the roast gases should be cleaned and dried, and the first step in this direction is to obtain a complete removal of the flue-dust. This is accomplished by having the gases ascend through lead towers, filled with coke fragments, over which wash water, or preferably, weak acid, trickles. The last traces of dust are removed by this means, the dust sticking to the coke. Moreover, the greatest part of the hydrochloric acid vapors are removed here, provided that the wash acid never goes over 45 deg. B. The wash acid which comes from the towers is rather high in copper, containing as much as 0.25 to 1 gram of copper per liter, and it also contains notable quantities of arsenic.

At first, on account of the presence of the copper, no use was made of this acid. However, the amount produced became greater and greater, and some use had to be found for it. It was out of the question to precipitate the copper by iron or zinc, and ultimately the scheme was adopted of using a dilute solution of calcium sulphide as the precipitant. Arsenic is likewise removed, provided no excess of calcium sulphide is added. The precipitated metallic sulphides, together with some calcium sulphate, are filtered in a sand filter. The greater part of the acid thus freed from copper and arsenic is kept for future use, and the remaining part is concentrated in lead pans until it is about 59 or 60 deg. B. The calcium sulphide is manufactured at the plant by boiling freshly burned lime with water and flowers of sulphur. The lime is made by burning mussel shells, which are gathered on the seashore.

The gases, which have been freed from flue-dust and arsenic, are carefully dried in a sulphuric acid coke-tower, and are heated again before being sent to the catalyzing apparatus. The heating is



done in a system of horizontal wrought-iron pipes. At first these pipes burned out very rapidly, but by changes in construction they are now made to last nearly six months. The temperature required for the reaction to take place is 250 deg. C., but the temperature in the catalyzing vessel is about 560 deg. C., due to the heat of reaction resulting from the transformation of SO<sub>2</sub> into SO<sub>3</sub>. From 90 to 96 per cent. of the SO<sub>2</sub> is thus transformed into SO<sub>3</sub>. With 1 kg. of the porous catalyzing substance, which contains finely divided platinum, there are obtained 2250 kg. of commercial acid, which is 93 to 96 per cent. H<sub>2</sub>SO<sub>4</sub>, per 24 hours. The fuel consumed is 0.75 kg. of coal per kg. of acid, required as follows: roasting, warming preliminary heaters, heating catalyzing vessel, steam boiler for pumps and air compressor, and for electric-light plant.

The degree of concentration of the roast gases appears to have an effect upon the efficiency of transformation into SO<sub>3</sub>. In this plant, roast-gases containing only 3 per cent. SO<sub>2</sub> are catalyzed better than richer gases. The best working of the process depends upon the following factors: The proper regulation of the temperature, and the time of contact of the gases in the catalyzing vessel, the proper purification and drying of the gases, and the selection of mattes free from arsenic. A small amount of hydrochloric acid vapor in the roast-gases does no damage, but a higher amount has a bad effect on the process. If too much of this acid is present, the amount of washing acid in the first purifying tower has only to be increased in order to eliminate most of the harmful vapors.

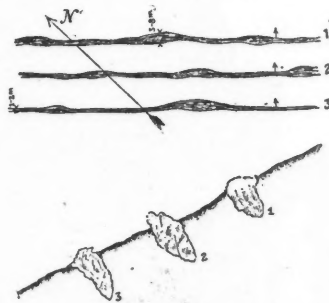
The SO<sub>3</sub> vapors which are, of course, drawn off from the catalyzing vessel, have a temperature of 300 to 400 deg. C., and require to be cooled before absorption. These vapors are absorbed by dilute sulphuric acid in wrought-iron caldrons. As soon as the concentration in the absorption vessels reaches 66 deg. B., the acid is drawn off. The acid required for the absorption of the SO<sub>3</sub> is prepared by mixing the wash acid that has been freed from copper and arsenic, by the addition of calcium sulphide as above noted, with the strong acid obtained by the concentration in lead pans of another portion of the acid from the calcium sulphide precipitation. The last portions of SO<sub>3</sub> pass through vertical towers, which are irrigated with concentrated sulphuric acid, and are nearly all absorbed. The gases that escape from these towers are under strong pressure and are passed off into the air through a chimney. The pressure in the catalyzing vessel itself is much lower, seldom exceeding 4 to 5 cm. of mercury. The acid, as made, is a light-brown colored liquid, having a specific gravity of 1.831 to 1.841. The brown color is due to organic matter and does not interfere at all with the properties of the acid, although it took

some time to convince consumers of this fact. Following is the analysis of the acid:

H <sub>2</sub> SO <sub>4</sub> .....	97.21 per cent.
Pb, Cl, and As } .....	traces.
CaO .....	
PO <sub>2</sub> .....	0.0089 per cent.
Fe.....	0.0460 per cent.

The chief use of this sulphuric acid is in the leaching of low-grade ores of copper. Other uses are found, however, such as the production of other organic and inorganic acids, the manufacture of blue vitriol, nitroglycerin, etc. The combination of a nitroglycerin and a leaching plant is very advantageous, as the diluted and impure sulphuric acid, which is turned out by the nitroglycerin plant as worthless, lends itself very readily to the leaching of low-grade copper ores.

The deposits of ores suited to leaching purposes are very widely distributed over Chile. They carry from 2 to 6 per cent. copper, and occur as oxide outcroppings.



TYPICAL COPPER DEPOSIT.

They stand up in relief and on this account, as well as on account of their green and blue color, are easily found. These deposits as a general thing stretch out horizontally more than they do vertically, and are very deceptive, often pinching out when least expected. Peculiar couches or hollows are formed, exactly as if wedges of ore (1, 2, 3, in the figure) had been extruded above the earth's surface. The deposits are seldom of continuously even width; they are sometimes from 2 to 8 m. broad and then pinch together again; their depth rarely exceeds 15 m., and if they do go farther down, their character usually changes to sulphide ores. A large average sample of ore from the neighborhood of Andacollo had the following composition:

Cu.....	3.58 per cent.
Si O <sub>2</sub> .....	77.50 per cent.
Fe <sub>2</sub> O <sub>3</sub> .....	10.25 per cent.
Al <sub>2</sub> O <sub>3</sub> .....	2.85 per cent.
CaO .....	2.78 per cent.
MgO.....	0.32 per cent.
SO <sub>3</sub> , as gypsum.....	0.74 per cent.
CO <sub>2</sub> .....	1.19 per cent.

From an ore of this character, 30 kg. of copper can be extracted per ton of ore by the use of 90 kg. of sulphuric acid of 65 to 66 deg. B.

The following general statements may be made concerning the process of leaching these low-grade ores:

(1) The most essential condition is that

the copper should be in an oxidized form.

(2) There should be no gangue in the ore liable to decomposition by sulphuric acid, such as limestone, siderite, or other carbonates; ores with much clay are likewise to be avoided.

(3) The financial success depends wholly upon the amount of acid which must be used. According to the practical experience of plants in the district in question, there is required from 1.6 to 3 kg. of 66-deg. acid per kg. of copper extracted.

(4) The ores must be crushed in rolls, or in ball mills, to fine size, varying from 1.5- to 3-mm. grains.

(5) Dilute acid of 5 to 10 deg. B. is essential for the best leaching results, experiments on a small scale in the laboratory being necessary in order to determine what is the best working strength of acid. If the concentration of acid is too great, crystals of copper sulphate are formed, which are brought into solution again only with difficulty. The hot dilute acid is allowed to act on the ore, which is contained in vats or revolving barrels. The vats are not over 1 m. high, and are constructed of wood or of masonry. If the ore does not contain much clay, the extraction of the copper is complete in 24 to 48 hours, depending on the character of the ore, carbonates being extracted more readily than silicates. Much time is saved by using some form of rotating apparatus, in which a charge of like tonnage requires only 3 to 4 hours to accomplish the leaching. The extraction of copper varies from 75 to 90 per cent. When no more copper will go into solution, the liquor is drained off into clarifying vats, from which it runs over copper-bearing ore particles in order to neutralize the excess of acid. Then the solution is conveyed to the precipitating vats. The residue left in the leaching tanks is washed several times with water, and the wash water lowest in copper is used for diluting concentrated acid in readiness for another leaching. For the treatment of a ton of ore not more than 30 cu.m. of water are necessary.

(6) The precipitation of copper from the solution is effected by wrought-iron scrap. About 0.5 to 2.5 parts of iron to 1 part of copper are necessary. The precipitation is much hastened by heating or agitating the solution.

Below are given figures for a plant of 100-ton daily capacity, located in Antofagasta and working on a 5-per cent. ore. These figures will show what profit is to be made under quite adverse conditions.

100 tons ore.....	\$1,138
11 tons sulphuric acid .....	1,320
10 tons iron for precipitating .....	250
7 tons coal.....	140
Superintendence and labor.....	300
Supplies and general expenses.....	30
Freight on cement copper.....	50
Interest and liquidation.....	100
	<hr/>
	\$3,328

This makes the cost of working a ton

of ore \$33.28. These 100 tons of ore produce 6 metric tons of cement copper containing 4500 kg. of pure copper, or, therefore, a 75-per cent. product. A metric ton of cement copper is quoted at Guayacan at \$664. The operating account then stands:

Value of daily production.....	\$3,984
Operating expenses per day.....	3,328
Daily profit.....	\$656

In the course of time the cost of acid will be less, but the scrap iron will increase in price. Moreover, Antofagasta is the dearest place on the Chilean coast, ordinary laborers receiving \$4 per day and skilled laborers twice as much. It appears then that under more favorable conditions a greater profit could be made.

### Tin Mining in Bolivia.

In a recent interview with John Penberthy, of Redruth, Cornwall, a correspondent of the *London Mining Journal* obtained the following information as to tin mining in Bolivia: The deposits occur both as lode and alluvial. The principal centers of production are, Chorolque, Potosi, Uncia, and Huanuni. Outside of these there are many points of minor importance that go to swell the production. The mines and plant of Penny & Duncan, the English company in Huanuni, the properties of J. B. Minchin in Uncia, the extensive industry owned by a French gentleman in Potosi, and the tin industry worked by Messrs. Aramayo in the Chorolque mountains, are all equipped with modern machinery.

Where there are no cart road and fodder available, the transport of all black tin is subject, absolutely, to rainfall. A drought means a total absence of grass on the hills, and paralyzes transport, which is entirely carried on by mules and llamas. Owing to the partial drought during the last three years, there are thousands of quintals of black tin locked up in Potosi and Chorolque awaiting transport. The Potosi and Chorolque mountains are distant about 100 miles from the nearest railway station, and it costs more to transport the mineral that distance than it does to send it from the railway station to Liverpool. The accumulations of black tin at Potosi and Chorolque are referred to in brokers' circulars as a standing menace to the market. This is not so, at least at present, and for this reason: At no time, even under the most favorable climatic conditions, are there sufficient mules and camels available to increase the transport of black tin to the coast to such an extent as would in any wise affect the stability of the market. Until railways come to the mines, capitalists engaged in Bolivian tin mining enterprises have to be prepared to face the difficulty of carrying stocks on hand.

Another difficulty, and that the almost universal one, is the labor problem. The Bolivian miner is a hard worker, amen-

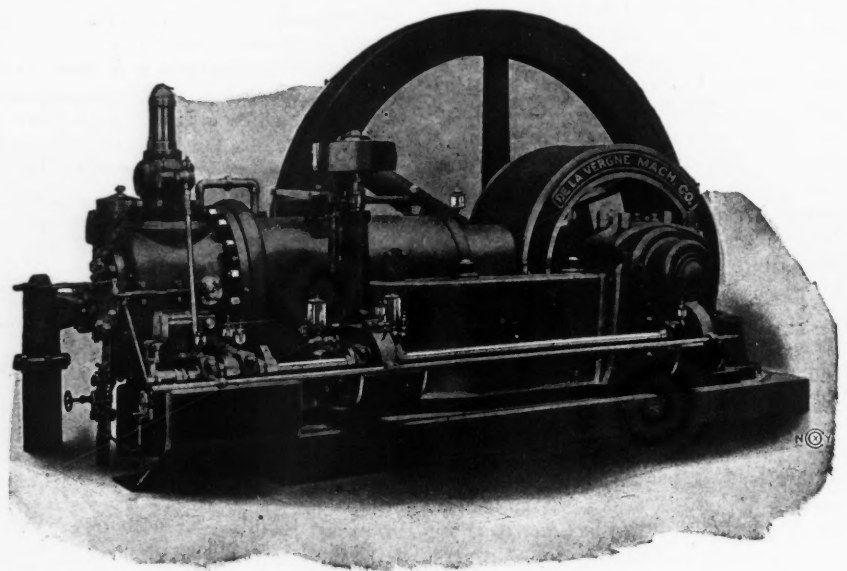
able to discipline, respectful to his superiors, and obeys orders without grumbling, but the curse of drink has obtained a greater hold on him than on any other class in the world, and it is rapidly killing off the mining population.

An increased output from Bolivia such as would materially affect the metal market is, under present conditions, a contingency which calls for little consideration. In time, however, the Bolivian output will become a very serious consideration, if not a preponderating factor, in the world's supply. That time will come when railway facilities from the mines to both the Atlantic and the Pacific seaboard make mining not only of high-grade, but of the immense low-grade deposits, at pre-

### The Koerting Four-Cycle Gas Engine.

The Koerting engine, shown in the illustration, is used largely in Europe. It is heavily built and is adapted for continuous and heavy work, at low speed.

A special feature is the automatic mixing valve in which the mixing of gas and air is done. The mixture is uniform and constant, independent of load and speed, and positive starting is thereby attained in minimum time. Besides the ordinary water-jacket cooling, an offset or tongue in which water is circulated projects into the front of the cylinder; this allows high compression without danger of pre-ignition; this, together with the mixing valve,



THE KOERTING FOUR-CYCLE GAS ENGINE.

sent untouched, a payable proposition. The completion of the railway system, which has recently been financed, is, however, a matter of five or six years.

It goes without saying that, with the price of tin obtainable for a considerable time past, every tin-mining property in Bolivia has been run for all it is worth. Looking at the excessive difficulties of transport, and other factors previously stated, it is improbable that there will be any increase in production in the near future that would adversely affect the market.

The manganese-bronze of commerce is now practically confined to two grades: First, a mixture for rolling into sheet, or drawing into wire or tubes. This grade is also used for forging. As this mixture contains no aluminum, it cannot be cast in sand. The difference between this, the rolling mixture, and the mixture for sand casting is in the absence of aluminum and a slightly less zinc content. Second, a mixture for sand casting. This sand-casting mixture is the one extensively used for the manufacture of propellers and other well known appliances.

conduces to the attainment of high efficiency. The cylinder cover is removable and allows inspection of the valves and the cylinder without removing the piston.

In most vertical engines the inlet valves open, more or less in proportion to the load; this causes trouble and sticking of the valves when operating under a varying load, and the valves of this engine are therefore designed to always open full.

The governor is connected with a butterfly valve, which regulates the quantity of the mixture to be admitted to the cylinder according to the load requirements. The exhaust valve is a little above the bottom of the cylinders. This prevents oil residuum from passing from the cylinder into the valve, which would cause backfiring. A relief valve is provided at the bottom of the cylinder for blowing out such oil residuum as may gather.

The engine is built by the De La Vergne Machine Company, of New York, at whose plant a 75-h.p. engine is in operation in connection with a Koerting suction gas producer, developing one brake h.p. per hour with less than 1 lb. of coal.



**Abstracts of Official Reports.***Tasmanian Copper Company.*

This is an English company, operating numerous copper mines in Tasmania and South Australia. The report deals with the year ending Dec. 31, 1905, and shows that the balance to the credit of profit and loss account for the year amounted to £11,877. Out of this sum, £10,411 were set aside to redeem debentures. There remain £8340 worth of debentures outstanding, which it is proposed to redeem during the present year. Then the company will be free of debt and probably in a position to declare dividends.

The company's most promising mine at present is the Blinman, situated near the town of that name in South Australia. During the year, mining operations were considerably hampered by scarcity of water and transport facilities which restricted smelting work to about 8 months. The ore mined amounted to 12,375 tons, and this resulted in the return at the smelters of 1798 tons of matte, averaging 59.43 per cent. copper. The profit on the working account of this mine during the year was £16,777. During the year, 370 ft. of development work was done, and it is estimated that over 21,000 tons of ore averaging 5 per cent. copper are ready for stopping. The excellent results obtained from this property determined the management to secure other mines in the locality. The chief purchase during the year was the Sliding Rock mine, situated 40 miles north of Blinman. This mine was worked many years ago by a South Australian company, but owing to its remoteness from smelters, no ore was marketed and the mine was closed down. The new owners propose to develop it vigorously during the present year.

The company's principal mine in Tasmania is the Roseberg, situated on the west coast. During the year, a contract was closed with the Tasmanian Smelting Company, Zeehan, for the sale of 40,000 tons of Roseberg ore at rates which will return the company a substantial profit. The mine continues to develop well. The average value of the ore is gold, 0.138 oz.; silver, 13½ oz.; and lead, 7.89 per cent. per ton.

The Ring River mine was actively worked during the year, and some high-grade ore was obtained. The ore in this mine averages 0.02 oz. gold, 3.35 oz. silver, and 7.76 per cent. copper.

*Mount Lyell Mining Company.*

The fifth report of this Tasmanian copper company deals with the fiscal half-year ending March 31, 1906, and states that the company's liquid assets represent a surplus of £514,240. The net trading profit for the period under review amounted to £255,648, after deducting £21,768 for writing off certain sums for depreciation of plant, and for carrying out special prospecting operations. This profit

shows an increase of £67,070, as compared with the previous half-year, and is the largest profit made in a similar period since the formation of the company in 1903. This prosperous condition is due, to a large extent, to the increased output, and to the high price of copper.

The copper-bearing ore extracted from the company's mines during the half-year amounted to 216,039 tons. It was produced as follows: Mount Lyell mine, 146,430 tons; North Mount Lyell and Tharsis mines, 57,694 tons, and metal-bearing fluxes from the Lyell Tharsis, South Tharsis, and Royal Tharsis mines, 11,960 tons.

The Mount Lyell mine continues to develop well. Benches Nos. 3B, 4 and 4A, at the northern end of the open cut, are the main ore producers. The average value of the ore is 0.99 per cent. copper, 1.92 oz. silver and 0.081 oz. gold per ton. The value of the metal-bearing material treated at the smelter during the period under review was as follows: 202,520 tons of ore from the company's various mines, assaying 2.41 per cent. copper, 1.84 oz. silver and 0.059 oz. gold per ton; 586 tons of purchased ore; 11,764 tons of flux assaying 1.63 per cent. copper, 0.44 oz. silver; and 4133 tons of flue-dust assaying 5.20 per cent. copper, 4.02 oz. silver and 0.1 oz. gold per ton. The converters treated 13,421 tons of matte assaying 40.22 per cent. copper, 31.47 oz. silver, and 1.08 oz. gold per ton, and produced 4621 tons of blister copper containing 4565 tons of copper, 374,762 oz. silver and 12,342 oz. gold.

The Royal Tharsis and South Tharsis mines were not worked, as the Lyell Tharsis and North Mount Lyell mines were able to supply all the flux required at the smelter. The North Mount Lyell mine was actively worked and yielded a larger tonnage than during any similar period. Prospecting operations below the 700-ft. level disclosed a new orebody of irregular dimensions which carries a large quantity of average-grade ore. The southern end of this orebody carries some very high-grade ore. During the present year this portion of the mine will be actively developed.

Robert Sticht, general manager, reports that the introduction of electrical power has resulted in decreased working costs, and is satisfactory in every respect. During the half-year an electrically driven surface-winding plant was erected on the Mount Lyell mine open cut, and another 400-kw. steam-turbine generating set has been ordered.

Working expenses were as follows: mining and delivering to furnaces 4s. 4d. per ton, smelting 6s. per ton, converting £1 per ton.

The success of the company has determined the directors to invest in other Tasmanian mines. During the half-year, leases embracing an area of 485 acres were secured at Red Hill, on the west coast, 18 miles north of the Mount Lyell mine.

On this property copper pyrite occurs in magnetite deposits in a felsite formation. Assays of the outcrop ore have given promising returns, and it is proposed thoroughly to explore and prospect the ground.

Satisfactory arrangements were also made for the purchase of further tin-bearing ground on the Blue Tier range. The company now holds in its own right, and under option, 1368 acres of tin-bearing leases, in addition to dam sites and water rights covering about 900 acres. In addition, the company has an option over 685 acres of the Blue Tier Amalgamated Company's leases. The cost of leases and water rights acquired by the company in its own right has been charged to the mine account.

An experienced tin miner has been placed in charge of the tin properties with instructions to prospect them thoroughly. Preliminary prospecting work has been put in hand. The investigation will involve surface trenching, diamond drilling, and shaft sinking. Should the prospecting results be satisfactory, a new tin-mining corporation with a capital of £260,000 will be registered in Melbourne.

The report states that the company's coke works, at Port Kembla, New South Wales, are not only able to meet all the company's demands for coke, but provide a surplus which is sold to engineering establishments in New South Wales and Victoria.

The company's chemical and superphosphate works in Victoria are also successful. The entire output of superphosphate and other fertilizers found a ready sale, and the results of the first half-year's operations have induced the directors to immediately duplicate the plant.

Strains in cold-worked iron or steel may be detrimental. A piece of straight, cold-drawn shafting, if machined, as for instance in key seating or in turning, is very liable to be not straight after the machining, as cutting away a part of the strained metal removes part of the stresses, and those remaining cause the resultant effect to be different from what it was, and the new adjustment necessary is found in a new shape of the piece.

**Patents Relating to Mining and Metallurgy.**

## UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Published Week Ended Aug. 21, 1906.  
828,881. METAL FURNACE—Alfred Fisher, Chicago, Ill. Filed July 14, 1905.  
828,923. ROCK-DRILLING MACHINE—Baptiste Cammas, Carbonado, Wash. Filed Nov. 14, 1905.

- 828,927. PULVERIZER—John C. Clark, Atlanta, Ga. Filed Feb. 3, 1904.
- 828,928. SCREENING APPARATUS—John C. Clark, Atlanta, Ga. Filed Sept. 27, 1905.
- 828,943. ROTARY ENGINE—Caleb Luker, Bellingham, Wash. Filed Feb. 1, 1906.
- 828,945. PORTABLE ELECTRIC DRILLING MACHINE—John Maclean, Ilford, England. Filed Jan. 12, 1906.
- 828,954. METHOD OF PROTECTING CRUCIBLES—Robert A. McDonald, Pittsburg, Pa. Filed Aug. 2, 1905.
- 828,963. CONCENTRATOR—Eugene Peters, George E. Bauder and Alexander D. Campbell, Seattle, Wash. Filed March 5, 1906.
- 828,976. PROCESS FOR RAPID HARDENING OF CEMENT—Herman Schneider, Cincinnati, O. Filed April 27, 1906.
- 828,993. CONCRETE BUILDING BLOCK—David J. Ames, Minneapolis, Minn. Filed Nov. 3, 1905.
- 828,994. CONCRETE-BLOCK MACHINE—David J. Ames, Minneapolis, Minn. Filed Feb. 16, 1906.
- 828,998. TUBE-MILL FEED—John Calwell, Chicago, Ill. Filed Sept. 16, 1904.
- 828,999. MANUFACTURE OF COAL BRIQUETS—George L. Croudace, Balmaln, near Sydney, New South Wales, Australia. Filed May 15, 1905.
- 829,021. FILTER TABLE—Frederick B. Leopold, Evanston, Ill. Filed Oct. 27, 1905.
- 829,039. LUBRICATING CAR WHEEL—John S. Smith, McHenry, Ky. Filed Oct. 6, 1905.
- 829,042. PROCESS OF PREPARING A MASS FOR MAKING BRIQUETS—Bernard Wagner, Berlin, Germany. Filed Feb. 3, 1905.
- 829,044, 829,045 and 829,046. BRIQUET MACHINERY—Theodore B. Wilcox, Newark, N. J., assignor of three-fourths to George W. Morgan, Jr., New York, N. Y. Filed Sept. 2, 1904, March 7, 1905, and April 22, 1905.
- 829,056. ROPE GRIP FOR SUSPENDED ROPE RAILWAYS—Oskar Brix, Leipzig-Gohlis, Germany. Filed April 22, 1904.
- 829,057. MEANS FOR HOISTING AND CONVEYING TWO-ROPE GRAB BUCKETS—Alexander E. Brown, Cleveland, O., assignor to The Brown Hoisting Machinery Company, Cleveland, O. Filed Feb. 10, 1906.
- 829,060. DEVICE FOR AUTOMATICALLY REGULATING THE SUPPLY OF STEAM TO GAS PRODUCERS—Joseph Delassue, Paris, France. Filed Dec. 22, 1903.
- 829,071. ROCK-DRILLING MACHINE OR ENGINE—Henry Hellman and Lewis C. Bayles, Johannesburg, Transvaal. Filed July 12, 1905.
- 829,100. MECHANISM FOR PIERCING OR SHAPING METALLIC INGOTS—Leonard D. Davis, Erie, Pa. Filed Sept. 3, 1901.
- 829,105. PROCESS OF REGULATING THE TEMPERATURE OF COMBUSTION IN GAS PRODUCERS—Henry L. Doherty, Madison, Wis., assignor, by mesne assignments, to Combustion Utilities Company, New York, N. Y. Filed Oct. 25, 1904.
- 829,127. MIXING APPARATUS—Julian B. Strauss, New Orleans, La. Filed Oct. 3, 1905.
- 829,133. MEANS FOR CONTROLLING SELF-EXCITING GENERATORS—Ernst F. W. Alexanderson, Schenectady, N. Y., assignor to General Electric Company. Filed July 20, 1905.
- 829,214. EXCAVATING MACHINE—Chas. C. Jacobs, Amboy, Ill., assignor to Jacobs Steel Excavator Company, Amboy, Ill. Filed Jan. 2, 1906.
- Published Week Ended Aug. 28, 1906.*
- 829,393. ROLLING MILL—William I. Finkenbinder, Duncannon, Pa. Filed June 19, 1905.
- 829,438. FURNACE DOOR—Geo. W. Shear, Joliet, Ill. Filed Jan. 15, 1903.
- 829,443. ORE CONCENTRATOR—Walter R. Thurston, Douglas, Ariz. Filed July 22, 1905.
- 829,448. APPARATUS FOR COKING BRIQUETS—Bernhard Wagner, Berlin, Germany. Filed Feb. 3, 1905.
- 829,471. CRUCIBLE FURNACE—Matthew Harvey, Cannock, England. Filed Oct. 21, 1904.
- 829,493. ORE CONCENTRATOR—Walter R. Thurston, Douglas, Ariz. Filed Oct. 9, 1905.
- 829,508. STONE-QUARRYING MACHINE—Roy K. Cronkrite, Bay City, Mich., and William C. Offer, Miami, Fla. Filed Oct. 8, 1904.
- 829,513. FALL-ROPE CARRIER—James G. Delaney and Asher Lambert, Newark, N. J. Original application filed March 18, 1904.
- Divided and this application filed March 22, 1906.
- 829,516. DEVICE FOR REMOVING ORE SLIMES FROM SETTLING TANKS—Henry Earle, Denver, Colo. Filed Nov. 3, 1905.
- 829,534. SAFETY DEVICE FOR INCLINE CARS—Manford Ludlow, Hanford, Cal. Filed Jan. 15, 1906.
- 829,541. GAS PRODUCER—Joseph G. Nash, Adelaide, South Australia. Filed Sept. 6, 1904.
- 829,544. FURNACE-CHARGING APPARATUS—Frank C. Roberts, Philadelphia, Pa. Filed Nov. 10, 1905.
- 829,566. CASTING APPARATUS—James Beakbane, Kingston, N. Y., assignor, by mesne assignments, to Doehler & Beakbane Manufacturing Co. Filed April 29, 1905.
- 829,574. FURNACE FOR THE IMMEDIATE PRODUCTION OF METAL FROM ORES—Oliver B. Dawson, Caldwell, N. J. Filed Oct. 25, 1905.
- 829,575. METALLURGICAL PROCESS—Oliver B. Dawson, Caldwell, N. J. Filed Oct. 25, 1905.
- 829,579. CONVEYER BELT—Ernest B. Folsom, San Francisco, Cal., assignor of one-half to Warren E. Murray, San Francisco, Cal. Filed April 5, 1906.
- 829,595. BLASTING CAP—Dougald McEachern, Erie, Canada, assignor of one-half to James L. Kane, Marble, Wash. Filed Dec. 20, 1905.
- 829,633, 829,634, 829,635. DRILL—Harry R. Decker, Houston, Tex. Filed Nov. 11, 1905; Nov. 13, 1905; Nov. 14, 1905.
- 829,651. GAS PRODUCER—Wm. B. Hughes, Philadelphia, Pa. Filed Oct. 21, 1905.
- 829,667. DUMPING CAR—Francis Peteler, Minneapolis, Minn. Filed Oct. 6, 1905.
- 829,676. METALLURGICAL FURNACE—George W. Shear, Joliet, Ill. Filed Dec. 12, 1902.
- 829,694. OIL-WELL DERRICK—Warren O. Covey, Marietta, Ohio. Filed Dec. 8, 1905.
- 829,702. STAMP MILL—William W. Edwards, Los Angeles, Cal. Filed Jan. 15, 1902. Renewed Jan. 22, 1906.
- 829,717. HOT-BLAST STOVE—Carl W. A. Koelbeck, Cleveland, Ohio. Filed March 14, 1903.
- 829,718. BELL GEAR FOR BLAST FURNACES—Carl W. A. Koelbeck, East Cleveland, Ohio. Filed Oct. 23, 1905.
- 829,757. MINER'S SAFETY AND OTHER INCLOSED PORTABLE LAMP—William Best, Morley, England. Filed Jan. 30, 1906.
- 829,765. PROCESS OF RECOVERING SULPHUROUS OXIDE—Franklin R. Carpenter, Denver, Colo. Filed June 19, 1905.
- 829,778. MANUFACTURE OF SULPHATE OF COPPER AND CAUSTIC ALKALIS—Henri M. Granier, Villembomhe, Seine, France. Filed March 12, 1904.
- 829,819. ORE ROASTER—Ray E. Wickham, University, N. D. Filed June 22, 1905.
- 829,824. MINER'S LAMP—Rudolf Zicha, Cleveland, Ohio. Filed April 2, 1906.
- 829,843. ROASTING AND VOLATILIZING FURNACE—Selden I. Clawson, Salt Lake City, Utah. Filed Sept. 9, 1905.
- 829,867. ARMORED CONVEYER BELT—Leonhard J. Hohn, Oroville, and Robert Schorr, San Francisco, Cal. Filed Nov. 27, 1905.
- 829,882. EXCAVATING MACHINE—Ezra A. Mathers, Philadelphia, Pa. Filed Dec. 11, 1905.
- 829,884. FLOATING-METAL-SAVING DEVICE FOR CONCENTRATORS—Claude L. Morgan and Joseph F. Hohelsel, Idaho Springs, Colo. Filed April 11, 1904.
- 829,919. APPARATUS FOR PRODUCING POWER GAS—Ludwig Hertzog, Berlin-Südende, assignor to the firm of Adolph Saurer, Arbon, Switzerland. Filed Sept. 10, 1904.
- 829,935. COKING RECEPACLE—Horace J. Wickham, Manchester, Wilbur L. Shepard, Elmwood, and Frederick C. Rockwell, West Hartford, Conn. Filed Nov. 16, 1905.

## GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

*Published Week Ended Aug. 4, 1906.*

- 17,267 of 1905. CHEMICAL EARTHENWARE—S. H. B. Langland and H. O'Connor, Glasgow. In sulphate of ammonia plants, the use of a saturator and draining tray, each made of one or more parts of china or other earthenware, instead of lead, as at present

19,876 of 1905 GRAVEL WASHER—L. P. Bowler, London. An improved machine for washing alluvial gravels to recover gold, tin, diamonds, etc.

19,884 of 1905. SLAG BRICK MOLD—T. W. Ridley, Middlesbrough. An apparatus of the endless-chain type carrying molds for the purpose of making bricks from blast-furnace slag.

23,186 of 1905. SAFETY LAMP—A. Smith, Manchester. Improvements in miners' safety lamps, particularly for the object of strengthening the shields.

24,003 of 1905. IRIIDIUM MIRROR—H. C. Parker, New York. A method of depositing metallic iridium in the form of a film on quartz in such a form that it can be used for reflecting purposes.

7541 of 1906. JIG ARRANGEMENT—R. M. Howatt, London. In jigs for washing coal, etc., arranging a number of jigs round one common washing chamber, into which the refuse from all of them is discharged.

10,513 of 1906. BEARING METAL—Siemens & Halske, Berlin. An improved alloy for use in bearings, consisting of equal parts of zinc and cadmium, with about 10 per cent. of antimony.

*Published Week Ended Aug. 11, 1906.*

14,227 of 1905. MINE DUST REMOVAL—H. C. Booth, London. Application of a vacuum pump for removing dust from coal mines and so decreasing the liability of explosions.

14,418 of 1905. HYDRAULIC WASHER—C. B. Storey, Lancaster. An apparatus for treating alluvial and other minerals for the extraction of gold, precious stones, etc.

18,119 of 1905. LAYING COAL DUST—E. D. de Liehaber, London. For the purpose of laying dust in coal mines, sprinkling with a solution of calcium chloride, which not only keeps the dust moist but renders it fireproof.

20,820 of 1905. SAFETY LAMP—E. A. Hallwood, Morley, Leeds. Improvements in safety lamps, with the object of preventing the gas entering through leaks.

20,961 of 1905. SMELTING FURNACE—W. Kemp, Tucson, U. S. A. A smelting furnace in which the ore is fed down a central channel and the fuel down channels surrounding the ore, with arrangements for introducing the blast so that it shall not pass through the fuel but up through the ore.

24,724 of 1905. ELECTROLYTIC BATH—F. Darmstadter, Darmstadt, Germany. For the purpose of improving the regularity of the electrolytic deposition of tubes, etc., the addition of kieselsol to the electrolyte.

2649 of 1906. ROCK DRILL—R. Bryan and E. Bryan, Wrexham. Improvements in percussive rock drills, with the object of making the machine lighter.

9799 of 1906. REDUCING FURNACE—E. A. Gronwall, Ludvika, Sweden. In smelting furnaces using carbon monoxide as a reducing agent, an improved method of regenerating the carbonate dioxide formed.

9906 of 1906. REFRACTORY BRICK—E. R. Stowell, Corydon, Indiana, U. S. A. A refractory brick consisting of amorphous carborundum mixed with 10 or 15 per cent. of portland cement

*Published Week Ended Aug. 18, 1906.*

14,733 of 1905. H. Wilkins, Sheffield. Increasing the ductility and tensile strength of german silver by adding 3 per cent. or less of manganese.

14,884 of 1905. T. Parker, London. An electric furnace in which the charge is heated both by induction and by resistance, by passing an alternating current through conductors spirally arranged in the bottom, sides and top.

14,949 of 1905. J. G. Leyner, Denver, Colo., U. S. A. Detailed improvements in the mechanism of percussive rock drills operated by compressed air.

14,972 of 1905. General Electric Company, Schenectady, N. Y., U. S. A. Producing metallic thorium by converting the dioxide into tetrachloride and reducing with sodium in a vacuum.

19,709 of 1905. H. L. Sulman, London. Conducting the process of flotation of sulphides by means of oil at the boiling point of the floating solution.

21,963 of 1905. T. B. McKenzie and D. Colville & Sons, Motherwell, Scotland. In open-hearth steel furnaces, in which slag from a previous charge is mixed with the metal to be refined in order that the metal shall not be oxidized or the lining attacked, the provision of extra low door to allow of the drawing off of the surplus slag.

23,586 of 1905. W. Croke, Millom, and A. Croke, Frodingham. An improved apparatus for charging blast furnaces.



**Personal.**

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

Cyril E. Parsons is manager of the Eldorado mine at Lomagundi, Rhodesia.

Louis P. Gorton, of Detroit, Mich., has been looking over Utah mining interests.

W. B. Milliken has returned to Denver after a six months' professional trip to Nevada.

Frank Lawrance, of South Australia, is now in Idaho Springs on professional business.

E. C. Thurston, of Denver, was at Revelstoke, British Columbia, about the middle of August.

E. W. Sebben is visiting southern Arizona to make examinations of several large properties.

S. A. Worcester, of Victor, Colo., has returned from a professional visit to Central City and Idaho Springs.

Anton Eilers, of New York, is looking over the Utah smelters of the American Smelting and Refining Company.

Theodore Tonnelé, of the Tonnelé Engineering and Construction Company, Pittsburg, was in Toronto this week.

Keijiro Nakamura, chief metallurgist of the Besshi copper mines, of Japan, has been a recent visitor at Denver, Colo.

S. T. Wellman, of Cleveland, Ohio, president of the Wellman-Seaver-Morgan Company, has returned from a visit to Japan.

R. R. Lund has been appointed chemist and assayer to the Old Union Mining and Milling Company, of Breckenridge, Colorado.

Tadashiro Inouye, mining engineer, passed through New York last week on his way from Japan to Europe, on professional business.

Clarence E. Allen, mines manager of the United States Smelting, Refining and Mining Company, has returned to Salt Lake from a trip east.

J. V. Hoover, president of the Mason-town Mining Company, of Frisco, is in Colorado looking up his many mining interests in that State.

N. C. Bonnevie, general manager of the Denver Ore Testing and Sampling Company, is visiting Alma and Breckenridge on professional business.

P. W. Sothmann, former consulting engineer of New York, has been appointed chief engineer of the Hydro-Electric Power Commission of Ontario.

H. A. Rowley, of Pottsville, Penn., has accepted the position of superintendent of the Northern Iron and Steel Company's rolling mill at Collingwood, Ontario.

Arthur Harold W. Cleve, superintendent of the royal mint, England, is coming to Ottawa to superintend the installation of the machinery at the Canadian mint.

Wallace Stephens, of the firm of Henry E. Wood & Company, of Denver, is in California making examinations. Mr. Stephens will visit Mexico before returning to Colorado.

F. N. Flynn, for the past year superintendent of the smelting department of the Compania Metalurgica de Michoacan, at Ocampo, Michoacan, Mexico, has resigned that position.

A. D. Carmichael, of London, England, who is making an extended visit in this country, has gone to Douglas, Arizona, where he will be occupied with some professional work.

O. P. Stephens, for the past two years accountant for the South Western Brokerage and Investment Company, at Frisco, Colo., has resigned his position and returned to his home in Mississippi.

S. Herbert Cox, of the firm of Bainbridge, Seymour & Company, mining and consulting engineers, London, England, is looking over the gold-mining sections of the Cariboo district of British Columbia.

C. L. Constant, of New York, is making an examination of the Nickel Plate mine on Twenty-Mile creek, Similkameen, British Columbia, in which the estate of the late Marcus Daly is largely interested.

Lawrence M. Lamb, assistant paleontologist to the Geological Survey of Canada, has been collecting fossils in the Cariboo and Similkameen districts of British Columbia for departmental purposes.

Samuel W. Traylor, of the Traylor Engineering Works, New York, visited Republic camp, Washington, early in August. He investigated conditions at Quilp mine and obtained samples of ores for test purposes.

C. V. Haines, a well known mining engineer of India, was in Ottawa this week. He stated that there is an increasing interest on the part of the better class of natives in the rapidly developing mining industry of that country.

Prof. Willet G. Miller, who has charge of development of veins on the Gillies Timber Limit, Ontario, will attend the International Geological Congress at the City of Mexico, leaving his Government work in charge of mining inspector E. T. Corkill.

Daniel Guggenheim, S. R. Guggenheim and A. C. Beatty have returned to New York from their trip to Alaska, where they have been investigating the interests of the Guggenheim Exploration Company, and the general industrial conditions of the Territory.

Howard W. DuBois, of Philadelphia, who is investigating the hydraulic gold-mining resources of Twenty-mile creek, Quesnel river district, of British Columbia, was at Barkerville and La Fontaine Cariboo, recently inquiring for platinum, osmiridium, and other rare metals.

Robert H. Richards, of Boston, Mass.,

has just returned home from visiting Denver and Chicago, where he has made arrangements for manufacturing his classifiers. During his recent western trip, Professor Richards also made professional visits in Colorado and Missouri.

Myron K. Rodgers, late general manager of the Yale Mining Company and Daly Reduction Company, operating in the Similkameen district of British Columbia, has gone to Alaska for Eastern capitalists who are interested in the Copper River & Northwestern Railroad project. He was accompanied by an engineering party of 16 and will make a survey of the harbor at Katella, Controller bay, near the mouth of Copper river.

Dr. Otto J. Klotz, chief clerk and astronomer of the astronomical branch of the Canadian Department of the Interior, is in Yukon Territory, working in conjunction with F. A. McDiarmid, one of the observers of the Dominion Astronomical Observatory, Ottawa, Ontario, and Edward Smith, of Washington, D. C., determining the location of the 141st meridian, which, by treaty, forms the boundary between Alaska and the Yukon to within a short distance of the Pacific coast.

**Obituary.**

E. T. Hannam, inventor of the Atlas water-tube boiler, died suddenly of heart disease in Chicago, Aug. 18. He had been for three years past with the Atlas Engine Works, of Indianapolis, and was highly esteemed by his associates.

James Dredge, joint editor of *Engineering*, died at London, Aug. 15. Mr. Dredge was Royal Commissioner to the Centennial Exposition at Philadelphia in 1876, and to the World's Fair at Chicago in 1893, and had a high reputation as an engineer and engineering editor. He was the author of "Electrical Illumination," "Thames Bridge," "Transportation Exhibits at the World's Columbian Exposition," and other works.

William Crane Squier, one of the pioneers of the zinc industry in America, died at his home, in Rahway, N. J., Aug. 31, aged 94 years. He was born there on January 8, 1812, and was the son of Jonathan and Hannah Squier, whose ancestors came from Suffolk county, N. Y., and who were of Scotch descent. He attended school in Rahway, and after graduating at Princeton, attended the New York University. In 1836 he went to New Orleans and began his business career as a manufacturer of clothing. While there he was a director of the Commercial Bank, and the Western Marine Insurance Company. In 1852 he went into the zinc business with Richard R. Manning, of Brooklyn, under the title of Manning & Squier. In 1854 they organized the Passaic Zinc Works, acquiring zinc mines in Sussex county, N. J., and erecting a smelter and oxide plant at Jersey City, N. J. Mr. Squier was the

first president of the company, and held the office 21 years. He was a director of the company and one of the largest stockholders. In 1896, this company went into the general consolidation of zinc-mining and smelting interests in New Jersey and Pennsylvania, which was formed by the New Jersey Zinc Company. At the time of his death, Mr. Squier was president of the Rahway Savings Institute, a life member of the New Jersey State Historical Society, and one of the organizers of the Rahway Library Association.

Jay C. Morse, one of the founders of the firm of Pickands, Mather & Co., Cleveland, died at his home in that city Aug. 22, after a prolonged illness. Mr. Morse was born in Painesville, O., 68 years ago. He went to Cleveland when 20 years of age, and secured employment in a railroad freight office. He afterward entered the employ of the Cleveland Iron Mining Company as its agent in the Marquette district, where he remained until 1882, when he returned to Cleveland as vice-president of the company. A short time afterward he helped to organize the firm of Pickands, Mather & Co. He did not take an active part in the local management of the firm, but the other members consulted him frequently, and valued his advice. In 1885, Mr. Morse became president of the Union Iron Company of Chicago, which afterward consolidated with the Illinois Steel Company. He was president of the Illinois Steel Company until succeeded by John W. Gates. Mr. Morse was also president for a time of the Minnesota Iron Company, and helped to organize the Minnesota Steamship Company. He remained at the head of these companies until 1895, when, on account of ill health, he retired from the presidency and served only as director. He continued as chairman of the various directorates for several years longer, and then retired from business. Some years after the death of Colonel Pickands, Mr. Morse married Mrs. Pickands, the widow of his former partner, and sister of the late senator M. A. Hanna. In recent years Mr. Morse spent a considerable part of his time in Thomasville, Ga., where he had a home. He divided the remainder of his time between Cleveland and Chicago.

#### Societies and Technical Schools.

*Case School of Applied Science*—This institution, at Cleveland, Ohio, has established and equipped a laboratory for use in its mining course. The new outfit comprises complete equipments for a stamp-mill, amalgamating, chlorination, cyanide and smelting plants, to be operated throughout by motors. The complete mining and electrical equipment for these various processes has been furnished by the Allis-Chalmers Company, of Milwaukee. The stamp-mill equipment consists of a Challenge automatic feeder, and a three-stamp battery having stamps weigh-

ing 500 lb., with 100 drops each per minute, arranged to be driven by belt from a countershaft. In addition, there are copper plates electroplated on one side, a cast-iron amalgam trap, copper table for the front of the battery and a Tremain stamp-mill complete. The equipment further includes a crusher, a complete sampler, to cut out from  $\frac{1}{4}$  to  $\frac{1}{64}$  of the ore passed; a set of crushing rolls 12x12 in., belt driven, and a set 9x9-in. rolls. In the concentrating outfit are a 4-ft. Frue vanner, a Wilfley table 7 ft. long and a smaller table. There are four two-compartment Hartz jigs, each with compartments 7x15 in., which are duplicates of the machines furnished by the Allis-Chalmers Company to the Utah School of Mines. The concentrating equipment also includes a set of revolving screens 16 in. diameter and 24 in. long and a shaking screen 18x18 in. The classifier or sizer is of the four-compartment hydraulic type, each compartment being an inverted pyramid, having a total length of 8 ft. The Huntington mill used is of the  $3\frac{1}{2}$ -ft. improved type. The amalgamating plant includes a 30-in. amalgamating pan and a 4-ft. settler. The chlorination equipment comprises a chlorination barrel 24 in. in diameter and 36 in. in length, lead lined; a settling tank; a storage tank and a precipitating tank. The cyanide plant comprises a leaching tank, a solution tank, a gold tank, a sump tank, and a three-compartment zinc precipitating box with removable trays for holding zinc shavings. The smelting plant has a water-jacketed lead furnace complete, with movable curb and steel stack, and provided with dust-collecting pocket; a blower of  $3\frac{1}{2}$  cu.ft. displacement per revolution and operating at a speed of 200 r.p.m.; small slag pots, bullion molds, etc.; a set of iron work for a Whiting cupola, shell 27 in. diameter and 18 in. diameter inside of lining; a Bruckner roasting furnace 32x60 in. complete, arranged for gas-firing, and a mechanical roasting furnace with hearth 30x144 in., gas-burning. The equipment of electric motors necessary to operate the various types of machines is made up of seven Allis-Chalmers 60-cycle, 3-phase, 220-volt induction motors, varying from 1 to 15 h.p. in size.

#### Industrial.

The Buffalo Forge Company, Buffalo, N. Y., has closed a contract to furnish the Bethlehem Steel Company with forced draft equipment, consisting of six fans, with direct-connected engines and all equipment for a large addition to the Philadelphia & Reading repair shops. The company has also received a contract from the Mitsui Company, of Japan, for forges and heating furnaces.

The Atlas Engine Works, of Indianapolis, whose Chicago sales offices have for several years past been in the Fisher

building, will, upon completion of the new Fisher building in November, increase their present rather cramped quarters by the addition of several larger offices. Frank H. Baker, connected with the Atlas for over 20 years, will continue at the head of its Chicago organization.

#### Trade Catalogs.

Receipt is acknowledged of the following trade catalogs and circulars:

American Locomotive Company, New York City. Large Steam and Electric Locomotives; pp. 28, illustrated; paper, 9x5 in. 1906.

Standard Car and Foundry Company, Pittsburg, Penn. Pittsburg Fuel Saving Furnace; pp. 32, illustrated; paper, 10x6 in. 1906.

J. T. Baker Chemical Company, Easton, Penn. Baker's Analyzed Chemicals; pp. 26; 4x7 in. Also "Things Chemical," August, 1906; pp. 8, paper, 7x10 in.

H. W. Johns-Manville Company, 100 William street, New York City. The Manville Fire Extinguisher; pp. 8; paper, 3x5 in. 1906.

Carlin Machinery and Supply Company, Allegheny, Penn. Power Trench Pump; pp. 4, illustrated; paper, 6x8 in. 1906.

#### Construction News.

*Eva Gold Mines, Camborne, B. C.*—The high-pressure half of a Canadian Rand Drill Company's compound duplex Corliss-valve 15-drill air compressor has been ordered for this mine, delivery to be made during September. The compressor is to be direct-connected to a Pelton water wheel, 13 ft. 2 in. diameter. Four or five machine drills are also being obtained and 5500 ft. of 4-in. well-casing steel pipe for an air line from the company's 10-stamp mill in the valley, where the compressor will be installed, up the mountain to the mine. It is intended shortly to increase the capacity of the stamp mill to about 100 tons per diem, and an eventual increase to 40 stamps is contemplated.

*Dominion Copper Company's Smelter*—At the Dominion Copper Company's smelter at Boundary Falls, British Columbia, a second smoke-stack is being built. It is to be self-supporting, 8 ft. diameter and 100 ft. high, on a 10 ft. high concrete base. From the new furnace in course of installation there will be a balloon flue of steel about 100 ft. in length, and between this and the smoke-stack a brick dust chamber 50x30 ft. The furnace is being supplied by the Traylor Engineering Company, of New York. It is 44x255 in. at the tuyeres, of which there are 22 of  $3\frac{1}{2}$  in. on each side, these being set at 10-in. centers. The furnace will have the Giroux hot blast, to be used here for the first time in British Columbia.



**Special Correspondence.****San Francisco.** Aug. 29.

The work on the new smelter at San Bruno point is progressing rapidly. A contract has just been awarded for a long pier and ferry slip to deep water, so that large vessels may discharge at any stage of the tide. The pier will be 3000 ft. in length and will cost, including the slip near the outer end, \$150,000. At present there is no landing of any kind at San Bruno point, the depth of water being sufficient for large vessels. At the end of the 3000-ft. pier there will be a depth of 15 ft., but twice that depth will be required. The task of dredging will, however, be comparatively light, for the bottom in that neighborhood is not hard. The smelter will be half a mile inshore from the pier. It will probably be ready to begin operations by next spring.

As a result of the suit of a laborer, the equipment of the famous Temescal tin mines in Southern California has been sold by Sheriff Coburn for a debt of \$460. The machinery, pulleys and other equipment brought \$267 under the hammer. The suit was brought by Neely against the Southern California Tin Mining Company, which holds a lease from the British company, which owns the mine. These tin properties never have been successfully worked, either after or before the English company bought them. The company which has of late been trying to resuscitate the mines has evidently not been successful, as the mines are now practically closed, according to reports from that section.

A man named Stone has filed a homestead entry near Jacksonville, Tuolumne county, and it has been found that the entry embraces fully eight mining claims which have been worked for the last eight or ten years. The miners of that locality have clubbed together and put up a purse to fight the case, having first filed a mineral protest. This sort of thing has been going on for years in the mining regions, so that much mineral land has gone into the hands of homestead claimants. Generally if the mines are idle, and the owners absent, no one takes the trouble to file a protest and the entry goes through. The California Miners Association took this matter up some years ago, but it was found difficult to accomplish much to prevent such entries, unless men in the particular localities took an interest in watching for them.

Mr. Seineke has started with a corps of skilled men to use diamond drills on the properties of the Mammoth Copper Mining Company at Kennett, Shasta county. The various mines of the group will all be explored with the aid of these drills. This has been the practice of the Mountain Copper Company for some years.

The Sultana Mining Company, of Grass Valley, is about to install an electric trolley system for carrying ores from the mine

to the mill. The new electric road will be 2800 ft. in length, and will be well equipped to handle large loads. The motors are expected to haul 10 cars to a load, and in this manner it will not be necessary to make many trips a day, as the cars will likely hold three tons each. The road will commence at the Sultana mine, which was formerly known as the Green Mountain of Electric, and will cut across the company's ground to the Prescott Hill, where the mill is located. The company, which has now a 20-stamp mill, is about to double its capacity.

La Grange hydraulic mine, four miles from Weaverville, Trinity county, and generally known as the largest hydraulic mine in the country, has closed down for the season after having run three large giants since January. The close-down now is for the reason of lack of water supply. The clean-up for the season is reported as having been over \$200,000, at a total expense for operation of \$60,000. The hydraulic mines require but few men, this large one having but 20 at work in the mine proper and an equal number as ditch-tenders, etc. Work will not be resumed in the mine until the rainy season sets in again.

Very few of the deep mines of the State take the trouble to treat their mine timbers properly in order to prevent decay, but the Utica Mining Company, at Angels, Calaveras county, is now coating all its timbers with creosote.

Tehama is one of the agricultural counties of the State and has never been at all noted for minerals, though for some years more or less chrome ore was mined there. Now, however, it seems to have good claims to be considered as a copper-producing county. In the Tom Head district, the California & Massachusetts Copper Mines Company has been doing considerable development work. Recently the company cut at a distance of 65 ft. in the new tunnel on the Uncle Sam lode the continuation of the great vein of sulphide ore that was originally discovered by Burrill & Tracy. The ore tonnage disclosed bids fair to be immense, as the vein is over 20 ft. wide and great masses of clean ore that runs on an average of over 8 per cent. in copper and from \$6 to \$8 per ton in gold are being broken and piled on the dump.

A temporary injunction has been granted by the Superior Court, at Auburn, Placer county, restraining the sale of the Buckeye Gravel mine, which is advertised for sheriff's sale, under a judgment in favor of W. G. Witter. The property has been in controversy for some months, and a previous suit against Witter was fraught with charges of fraud and conspiracy. The present injunction is sworn out by Mrs. J. Collins and James A. Johnson, the original owners of the mine, in which they ask that sale under the previous execution be delayed until the issues of their rights are determined by

another suit which is proposed to be brought forthwith.

In the case of the Pine Hill Mining Company, Ltd., vs. Cerf Rosenthal, United States District Court, the jury brought in a verdict for the company for the amount sued for, viz., \$9310, with interest at seven per cent. since the time the suit was filed, some two years ago. Rosenthal was a superintendent of the Pine Hill mine for 21 months in 1902 and 1903, and the amount at issue was money the company alleged he had not accounted for. It was shown on the trial that Rosenthal had received \$43,544 from the mining company's officials in New York, and it was charged that he had failed to return vouchers for \$9310 of that amount. He took the witness stand and swore that he had expended every dollar for the benefit of the company and that he had sent the vouchers to the company. His books, which he said he had left at the office, could not be found. Secretary Mase swore that the vouchers had never been sent him.

**Salt Lake City.** Sept. 1.

Some attention is being paid to antimony deposits in this State. One property, owned by Benjamin Hampton, of Salt Lake City, is in successful operation; it is situated in Garfield county. It is being worked by leasers who haul the ore by wagons to Marysville, the nearest railroad point; some lots assay as high as 50 per cent. in antimony. There is another property near Logan, Cache county, which appears to have value as an antimony mine.

The Consolidated Flagstaff Mining Company, which recently took over the Flagstaff properties at Alta, has made the final payment after considerable difficulty experienced in straightening out titles. Deeds have been filed and the new company is now in undisputed possession.

A post office has been established at Gold Springs, Iron county. This is a new camp and is the location of the Jenny Gold Mining Company's property in which some extensive bodies of mill ore were recently developed.

The Western Pacific has its track laid several miles west of the Garfield smelters and is being pushed westward. Mine owners in the Deep Creek mining district are endeavoring to get the company to build a branch line to Clifton, where the Gold Hill mine is, before the completion of the through line to the coast. The Gold Hill has developed into a copper mine of some importance.

The Utah Car Service Association, of which all the Utah railroads are members, has undertaken to inflict new demurrage regulations upon the smelting and sampling companies by cutting the free time allowed for the unloading of cars down to two days. The announcement created a sensation in mining circles and resulted in many protests being filed with railroad officials. The effect of the order would

be to put the custom sampling concerns out of business, seriously handicapping the smelters and Salt Lake as an ore market. The transportation companies are short of equipment to handle the business due to the prosperous conditions prevailing in the West at this time and the movement was undertaken with the hope of getting equipment released sooner than has been customary heretofore. It is believed, however, that such pressure has been brought to bear that there will be a modification of the rules promulgated.

The Lead-Silver-Copper Company has filed articles of incorporation to operate in Morgan county. Chester N. Stone is president and George Halverson, of Ogden, is secretary.

Good Springs, Nevada, mining men have opened negotiations looking toward the purchase of the smelter at Milford, owned by the Majestic Copper Company. The plant was built by the promoters of the Majestic to aid in the disposition of stock.

The foundations for the new mill of the Boston Consolidated at Garfield are finished; but it will probably be October before the steel structure begins to go up.

A deal looking toward the consolidation of the Odin, Comstock and California mines at Park City is pending.

The ore and bullion settlements reported by Salt Lake banks last week reached a total of \$519,800.

**Denver.** Aug. 31.

A novelty in the mining line will be the construction of the first underground electric plant in this State, which will be installed in the Penrose mine, at Leadville, where the management expects to make use of a continuous stream of water flowing from the Bison workings. A Pelton wheel will generate sufficient electricity to supply the necessary lamps for the property.

Practically the entire force of molders at the Minnequa steel plant, at Pueblo, the property of the Colorado Fuel and Iron Company, went on strike a few days ago on account of the refusal of the company to increase their wages from \$3.50 to \$3.75 per day and a reduction in the workday from ten to nine hours.

At Gunnison the Vincent St. John case will come up for trial within a few days, St. John being accused of the murder of B. Burnham during the labor troubles at Telluride some time ago.

At a depth of about 170 ft. the local company of Lafayette, which intends to build a power plant to furnish light and power to the northern towns and farms of Colorado, has found some coal measures which promise well, and they will be at once developed.

**Scranton.** Sept. 1.

The tax payers of Northumberland, confronted with a debt of \$700,000 and encouraged by those of Columbia county,

who have won a decision that coal lands there will be assessed at a figure near their real value, are demanding that tax discrimination in favor of the coal corporations in that county cease. The merit of their demands is shown by the fact that an acre of coal land has, in a large number of instances, been assessed for less than an ordinary lot. From the assessments of eight large companies, in which improvements, such as breakers and other buildings and dwelling houses, are not considered, the average valuation of an acre of coal land is \$131.87. Some is valued as low as \$60, while some more is valued as high as \$158.35. The real value is not less than \$1000, and in many instances it is twice that amount. A vacant house lot, in Mt. Carmel, is assessed at \$540, for simply the surface right; there are seven such lots in an acre.

The officials of the United Mine Workers have decided to prosecute five members of miners' examining boards and at least 100 miners, the first on a charge of issuing fraudulent certificates and the latter on a charge of working under such certificates. It is claimed that the men who are working under fraudulent certificates are responsible for the majority of accidents in the anthracite region. Hereafter when mine cases are being looked into in Luzerne county, the coroner's jury will be obliged to learn authoritatively whether or not the miner possessed a certificate. The coroner has given orders to his assistants to that effect. The letter of instruction expressly stipulates that the jurors shall examine all certificates and ascertain whether or not the owners are entitled to them.

Unless something is done to subdue the gas which emerges from the burning mine, the little town of Warrior Run will be depopulated. There is only one mine there, the Warrior Run, and this has been idle for the past several months, because of a fire, which the management has been unable to control. Millions of gallons of water have been pumped into the burning mine, apparently with no effect.

**Toronto, Ont.** Aug. 30.

Prof. Willet G. Miller, who has been directing the exploration work undertaken by the Provincial Government of Ontario on the Gillies timber limit, has returned to Toronto. Speaking of some criticisms and fault findings in connection with the progress of the work, Professor Miller said that previous to its being undertaken it was generally supposed that the existence of rich veins was already known to many prospectors and that the exploring party would consequently have little trouble in locating them. This was entirely untrue, and the statements so freely circulated in the beginning of the season as to the deposits known to occur had been shown to be wholly unfounded. To test the matter the Government after determining to work

the limit, offered a bonus to anyone pointing out a workable silver vein of \$150 per inch for the width of the vein. Though some had tried to secure this bonus no one had succeeded in showing any valuable deposit, so that it was evident that the stories of rich mineral wealth being known to exist were either due to errors of judgment on the part of men who thought they knew, or downright lying. One fact which materially helped to create the wrong impression which prevailed, was that systematic thieving of ore from the working mines of Cobalt had gone on extensively, and frequently persons detected with ore in their possession obtained in this manner claimed to have taken it from the Gillies limit.

The one vein so far discovered by the explorers had been found by systematic trenching; it was covered by 4 ft. of soil. Contrary to the current belief to the effect that the deposits generally crop out on the surface, probably not more than half a dozen or so of the valuable veins in the whole Cobalt district have been found otherwise than by trenching or stripping. The process of prospecting is a particularly arduous one owing to the nature of the country, as the ground, in addition to being encumbered with forest vegetation, is often obstructed by heavy boulders.

**London.** Aug. 25.

The half-yearly report of the Broken Hill Proprietary Company cabled to London gives interesting information about the zinc situation. It has been decided to commence zinc smelting with a furnace of 120 retorts, having a capacity of 10 tons a week. The ultimate intention is to have 10 of these furnaces, but it has been considered best to run only one at first in order to see if any modification in smelting practice is requisite for this particular ore. Owing to the increase in prices of metals the profits per ton have greatly increased, and are £10s. 2d. per ton of ore treated as compared with 12s. 10d. during the previous half year. The total profit for the half year was £232,332. Further interesting details will be forthcoming when the full report comes to hand.

Last week I referred to the improvement in the profits at Dolcoath. This week the Carn Brea & Tincroft company has issued its report for the first half of the year. Here, also, the increased price of tin has had a very beneficial effect on the finances of the company, and coupled with the increase in the yield, has brought the half yearly profits to £10,162. During the 12 half-yearly periods since the present company was formed, the balance has been seven times on the wrong side. The ore is of lower grade than that of the Dolcoath, having ranged from 22 lb. of black tin per ton in 1903 to 30 lb. during the last half year. Moreover, the quality of the concentrate is lower and it does not bring so good a price. During the last half year, the average price obtained was



£95 per ton, which is £12 higher than in the previous half year, and £22 higher than a year ago. The amount realized from concentrates was £35,000, and slimes, etc., brought £5500. In addition copper and arsenic yielded £3000. The total receipts were £44,400. The expenses were £34,000. It is of interest to note that no wolfram was produced or sold during the half year. As regards prospects for the future, there are 15 points at which development work is being done, and at most of them the indications are favorable. In one particular section where a strong vein was found, which has supplied a good deal of the higher-grade ore during the last year and a half, the vein has become broken and of lower grade, but the miners confidently expect that an improvement will take place before long.

Johannesburg. July 30.

We are having anxious times on the Rand these days. During the past fortnight people have watched the coolies closely to see what effect the new poster, placed on all compounds by order of the Liberal Government, would have on the Chinamen. It will be remembered that some months ago a poster was stuck up, offering the coolies free passages to China. The number of applications was practically nil. In a spirit of pique the Liberals ordered a new poster to go up, offering far more liberal terms to the coolies. This latest poster has now been up for a fortnight. On the whole the attitude of the coolies has been satisfactory. The number of applications to date is about 275. Strange to say, the large majority of applications come from one district of the Rand. It is possible that in that district the government officials have encouraged the coolies to apply for repatriation. The attitude of the officials toward the poster has considerable affect with the coolies.

The danger is not yet past. As long as the poster remains up, there will be a wasting away of the coolies returning to China.

One or two diamond propositions are keeping the market from stagnation. The favorite just now is Robert Victors, which have had a phenomenal run. This new diamond find is in the Orange River Colony, about 70 miles northeast of Kimberly, and according to all accounts is going to be a success. Washing operations have commenced, and it is said that a return of 75 carats per load was obtained. The quality of the diamonds is very fine. Being in the Orange River Colony makes the property far more valuable than it would be were the mine in the Transvaal, where the Government takes 60 per cent. of the profits.

Those tin deposits of the Transvaal, to work which the South African Lands was organized with a great deal of enthusiasm, prove, upon a commercial test, to be unprofitable, and the mill will be closed.

## General Mining News.

### ALASKA.

#### KETCHIKAN.

*Alaska Copper*—The Alaska Copper Company, owning a group of copper properties situated on a high mountain at Hetta inlet, Prince of Wales island, and a smelting plant at Coppermount, on the inlet, is employing about 140 men at its mines and smelter, and is steadily increasing its working force, as more men become obtainable. The smelter is reducing about 200 tons of copper ore per diem. The returns from the last lot of matte shipped to Tacoma, Puget sound, Wash., for converting into blister copper, says the *Ketchikan Mining Journal*, showed an average, for the 112½ tons shipped, of 44.02 per cent. copper, 1.13 oz. gold, and 6.04 oz. silver per ton. The company recently purchased the bark "Hayden Brown," gross tonnage 864 tons and net 769; this vessel is being dismantled and converted into a barge which will be used for carrying ore to the smelter, copper matte to Tacoma, and coke and other supplies for smelter and mines up to Prince of Wales island. It is stated that the company has also purchased a coal mine and coke ovens in the State of Washington, whence fuel supplies will henceforth be shipped to Coppermount.

*Cymru Copper*—At the Cymru mine, on Moira sound, Prince of Wales island, the Cymru Copper Company has 1000 tons of ore awaiting the completion of the tramway from the mine to the dock, after which shipment to the smelter will be commenced. The ore bunkers on the dock have been finished; their holding capacity is now stated to be 1600 tons, which is larger than intended when construction was commenced. A locomotive, to be operated by gasolene, for hauling ore cars, has been taken from Ketchikan to Baldwin. It is planned to commence shipping ore early in September. Provision has been made to work the mine without interruption at all seasons of the year.

*Alaska Metals*—The Alaska Metals Company has erected a compressor house at Bruce, on the west coast of Prince of Wales island, where is situated the claim formerly known as the Corbin property, located along the coast line between Coppermount and the landing for Jumbo basin. The compressor and hoist are in position and it is expected they will be ready for operation by September 1. Several buildings for accommodation of miners have been erected. Shipments of ore taken out in the course of development are made at intervals to the smelter at Coppermount. The *Mining Journal* states that the ore improves in quality as depth is gained, and the outlook for the mine is considered promising.

*Shipping Mines*—The list of producing mines in the Ketchikan district is gradu-

ally becoming larger, although some of the properties mentioned below have not yet shipped any considerable quantity of ore. Nearly all the shippers are copper mines situated on Prince of Wales island. Included in the shippers are: The Cracker Jack (gold), Mt. Andrews, Uncle Sam, Brown-Alaska Company's Mamie, and Hadley Consolidated Copper Company's Stevenstown, all on Kasaan bay; Alaska Copper Company's Rush-Brown property on Karta bay, an inlet from Kasaan bay; Omar Mining Company's Kayyam on McKenzie inlet, a southern branch of Skowl arm; some gold-quartz claims at Dolomi camp; Niblack Copper Company's mine at Niblack anchorage; Cymru Copper Company's Cymru on Moira sound; Alaska Copper Company's Coppermount on Hetta inlet, and the Jumbo near Sulzer on the same inlet; and two west coast properties—Alaska Metal Company's claim (formerly known as Corbin's) at Bruce, and the Tyman's Red Wing. Some gold properties have been worked on Gravina island, and others on Revillagigedo island, and quartz from these has been milled. The entire group of islands of the Ketchikan district has been described by H. W. Turner, formerly manager of the Omar Mining Company's mines, as being fairly seamed with mineralized lodes, the ores being rich in sulphides and adapted to smelting operations. At present there are two smelters treating copper ores—one at Hadley on Kasaan bay on the eastern side of Prince of Wales island, and the other at Coppermount on Hetta inlet in the southern part of the island.

### CALIFORNIA.

#### AMADOR COUNTY.

*Kennedy Mill and Mining Company*—The new shaft at this mine, Jackson, having reached a vertical depth of 3107 ft., a station is being cut at the 3000 level and further sinking stopped for the present.

#### BUTTE COUNTY.

*Matheson*—The Los Angeles Company, which has a bond on this property and has deposited a forfeit, is expected to take up the bond in September and put up a larger mill than the four stamps in use. There are five claims on the property and the ledge is a wide one.

*Steiffer*—After several years' work on this drift mine at Coutolenc, the miners have broken through into the channel which is supposed to be a continuation of the old Perschbacher mine, which paid largely while worked.

*Copper*—N. T. Ellis, of Marysville, has bonded several copper prospects east of Honcut and is trying to obtain bonds on others.

*Matheson*—This mine, owned by D. H. Matheson, on the forks of Butte creek, has been bonded by Los Angeles men for \$50,000. The property has been worked by its owners in a small way for 10 years

past. A mill of considerable size is shortly to be built.

#### DEL NORTE COUNTY.

*Diamond Creek District*—Baker Bros., of Spokane, Washington, have the tunnel in 250 ft. on their cinnabar ledge. This is the first time systematic developments have been carried on upon the cinnabar in that section. Assessment and development work is being done by Chicago men on the Cleopatra group of copper claims in the same district.

*Old Channel Placer*—This company has been organized to work the placers on Myrtle creek. The ores are in Crescent City, and W. H. McCutcheon is superintendent, with Aug. Quitzow as secretary.

#### FRESNO COUNTY.

*Gypsum*—E. S. Jones and P. V. Fry, of Oakland, have purchased or bonded the gypsum mine at Coalinga and will commence work upon it at once, shipping the product to Oakland to be used as a fertilizer.

#### INYO COUNTY.

*Greenwater Death Valley Copper Company*—This company has been organized with offices at Tonopah, Nevada, and with Frank A. Keith as president and W. L. Carden as secretary. The property of the company consists of 18 claims, or about 360 acres, in the heart of the Greenwater copper district, on the southern end of the Funeral range. This property is the original location and is generally conceded to be the most promising of the district. The company will commence active operations by the installation of machinery in order to prospect and develop the orebodies. This company, together with its neighbor, the Furnace Creek Copper Company, better known as the Patsy Clark group, insures a thorough and complete development of the entire district.

*Emigrant Springs*—This mine in Wild Rose district, west of Death valley, is now owned by Robert Montgomery, who has a large force of men opening it. Water will be piped to the camp from two springs near by. Quite a town has been started near the mines.

*Darwin*—Indications from recent work show this to be more of a copper than a silver-lead camp. J. L. Giroux has bought the Chas. Richardson claims, and is sinking a double-compartment shaft on them. The Coso Reduction Company is concentrating and shipping ore from the dump of the old Defiance mine.

#### MODOC COUNTY.

*Strike*—A strike in decomposed quartz is reported east of Goose lake, about half way between the lake and the Nevada State line. Two companies are mining there. The strike was made in a region known as Dismal Swamp. The nearest point from which to reach the country is

Fort Bidwell. Other discoveries have been made within a few miles of the fort by W. R. Hall, of Red Bluff, Capt. E. S. Uter, of Sacramento, and others. Claims have been staked out by many. Mineral City, at the intersection of the north and west forks of Bidwell creek, is now a thriving camp of prospectors.

*White Mountains*—In this region of the county, near the village of Buena Vista, a number of mines are being opened, some of copper and some of gold. The mines are located only about 18 miles from the main power line running from Bishop to Goldfield, and electrical power can be easily obtained. Goldfield is about 50 miles distant.

#### NEVADA COUNTY.

*Woodberry*—Grass Valley miners, with a bond on this property on Osborn hill, have had a recent satisfactory crushing and are now at work in the south drift, where they have a ledge 2 ft. wide, and all of it is regarded as high-grade milling ore.

#### PLUMAS COUNTY.

*Greenville*—Quartz mining in this section is reviving to some extent, preliminary work on several long dormant mines having been inaugurated. This includes such one-time bonanzas as the Indian Valley, New York, Arcadia, Cleveland, McLellan and Altoona mines, while lesser known properties are also being got into shape for regular production. At least a dozen mines are the subject of exploitation and efforts are being made to get things into shape before the snow flies, so that underground development may be prosecuted during the winter to permit of starting up the mills in the spring. This is the most healthy quartz-mining outlook that Greenville has enjoyed in several years.

#### SAN BERNARDINO COUNTY.

*Telluride Ore*—Ore of this class is reported found in the Slate range and close to Lone Willow Springs, 35 miles northeast of Johannesburg. The belt extends in a northeasterly direction from Granite Wells, near Pilot Knob, to and beyond Lone Willow Springs. Over 250 claims have been located and leases have been given on them.

*Standard Mines Company*—The property of this company is located at Cima, 10 miles in a northerly direction on the main line of the Salt Lake road and about 14 miles from Ivanpah station on the Santa Fe road. It is reported that all the equipment for the mine is paid for. Since the advent of the Standard Mines Company into this district three other properties have been opened up and are now in active operation, and at the present time over 100 miners, engineers, etc., are employed.

*Desert Chief Mining Company*—This company has purchased a third interest in the Wild Goose, Golden Rod and other mining claims in the Morrow district from

J. H. Bartle, S. M. Slocum and others. For some months the group has been under development.

#### SHASTA COUNTY.

*Boulders*—The air compressor at this mine, Ferdinand Hurst, superintendent, has been started up and the machine drills were set at the face of the long tunnel that is being run to tap the main ore shoot. Development work on the Boulders will now be prosecuted with greater speed than heretofore. The tunnel that is being run is now 550 ft. long. It is designed to tap the ore at a level 800 ft. lower than the upper workings.

*Bonded*—The Summit and Graves mine and the North Mammoth Extension, located in the Clear creek and Shasta section, have been bonded to the Balaklala Company for something less than a year at a price well above \$100,000. The bonding company will put a crew of men at work prospecting.

#### SIERRA COUNTY.

*El Dorado*—This mine, on Kanaka creek, near Alleghany, has been lying idle until a few months ago, when H. L. Johnson, of the famous Tightner mine, took a bond on the property from Mrs. J. Fessler and family, the present owners of the property. He put a force of men at work extending the lower tunnel, and had not gone a great distance when he struck the pay shoot.

#### COLORADO.

##### TELLER COUNTY—CRIPPLE CREEK.

The Cripple Creek Drainage and Tunnel Company, which has been formed for the purpose of driving a tunnel to drain the entire district, has elected Sherwood Aldrich, of the Elkton, president; Frank G. Peck, of the Portland, vice-president; S. S. Bernard, of the El Paso, secretary; and F. F. Castello, of the Mary McKinney, treasurer. John T. Milliken, of the Golden Cycle, is also represented. They have already raised \$550,000 of the \$700,000 necessary.

##### SUMMIT COUNTY.

*Country Boy*—Since the Lanyon Zinc Company, of Iola, Kan., took up the lease on this property it has mined and shipped over 1000 tons of high-grade zinc ore. During the month of July, 19 cars containing over 450 tons were shipped. This ore ran nearly 50 per cent. zinc for an average. This ore has the appearance of concentrates and is easily mined, being picked out and shoveled into the cars direct. On each side of the main streak, which averages over 3 ft. in width, there is a considerable width of lower-grade ore which is being put into pile for future treatment by milling.

*Kitty Innes*—An increased force of miners has been put to work in the lower tunnel. After driving this a further 60 ft. an upraise will be put in on the ore-shoot to connect with No. 2 tunnel level. Stoping will then be commenced.



*Juno*—Coffelt & Deaner are now working this property under lease and are taking out and shipping some high-grade gold-silver ore.

*Montezuma*—This camp is showing up well this year and many new enterprises are now being organized.

*Lenawee*—This company now has its mill completed, and the stamps are dropping. The company has taken over control of the Fisherman mine, which is now furnishing an abundance of ore for the new mill.

*Little Jumbo*—This property is now being operated by E. W. Fairchild, of Montezuma.

*Lucky Baldwin*—This mine, on Collier mountain, is being worked by A. L. Harrison and George Worthington. The ore runs high in copper.

*Orizaba*—This is the name of a new company operating on Wise mountain, under the management of S. F. Stoughton.

*Braganza*—This famous property, on the north side of Collier mountain, is to be worked vigorously this summer. Mr. Nikirk is now having the road fixed for hauling the ore to Keystone.

*Swandylke*—This camp is showing signs of renewed activity on account of the general improvement in mining matters in Summit county.

*Three Kings*—Nibs & Co. have reached their main ledge by the crosscut tunnel in Sheep mountain; 10 to 18 in. of high-grade zinc ore is now shown in the walls of the tunnel.

*I. C. N.*—The shaft on this property is being sunk on a ledge of ore assaying 18 to 20 per cent. zinc and 15 oz. silver per ton. C. H. Johnson has charge of this work.

*French Pass*—P. L. Cummings reports a good find of copper on his property on French Pass near Mount Baldy. The property is hard of access, being above timber-line, but the quality of the ore is such as to warrant operating.

#### INDIAN TERRITORY.

##### CHICKASAW NATION.

*Oklahoma Portland Cement Company*—This new company has bought property at Ada, having deposits of limestone and shale, and purposes putting up works to make portland cement. The capital stock is \$300,000. Officers of the company are Messrs. L. A. Beck, Chicago, president; C. C. Bishop, Chicago, vice-president; J. M. Wintersmith, Louisville, Ky., secretary-treasurer, and William M. Whitaker, Mitchell, Ind., general manager.

#### LOUISIANA.

##### CALCASIEU PARISH.

*Jennings*—Jennings Heywood Oil Syndicate No. 15, on the Arnaudet tract, was brought in August 20; it flowed 5000 bbl. the first day, of which 25 per cent. was wa-

ter. The Heywood Oil Company brought in a 7000-bbl. gusher on Aug. 18. These new wells with extensive use of compressed air have increased the daily production to about 30,000 bbl. The increase will be temporary, for only two wells are gushing. The flow of salt water is increasing, and, while compressed air will stimulate the present output, it will lead to early pumping. At present this field is producing about one-half of the Gulf coast output.

##### CADDO PARISH.

*Shreveport*—Three wells are being drilled in this field. Plenty of gas has been obtained, but further development is needed to establish a producing petroleum field. Wells now drilling are: Savage & Richardson, down 2270 ft.; Sharp & Hardy, down 2200 ft.; Atlanta Oil Company, down 1500 feet.

#### MICHIGAN.

##### HOUGHTON COUNTY—COPPER.

*Atlantic*—President Joseph E. Gay thoroughly investigated conditions at this mine before returning to New York, and a plan of operation was mapped out. It was decided to abandon all efforts for the present toward the reopening of the mine on the old Atlantic lode. It was thought advisable to sink two new shafts about 50 ft. in the footwall, to replace the shafts in the lode that were closed because of caving, but this course was abandoned. It is believed that the prospects on the Baltic and other lodes traversing the property are more inviting than the future which is held forth in the old Atlantic lode. During the next few months all efforts will be concentrated upon the opening of the Baltic amygdaloid lode in sections 21 and 16, and the development of the unnamed lode resembling the Michigan's Calico lode, lying one-half mile east of and paralleling the Atlantic lode. The pit sunk last year on the Baltic lode in section 16 will be enlarged into a permanent shaft. A large amount of machinery was delivered at the location last year and practically all the equipment that is needed is on hand. About a mile of railroad track will be laid, work to begin at once. The new shaft that is being sunk on what is called the Calico lode is 100 ft. deep. It discloses a fair showing of copper, though not in commercial quantity.

*Baltic*—No. 2 shaft, which recently entered service, is shipping 400 tons of rock daily. The other shafts have decreased their production slightly, as the mill is stamping 2000 tons of rock daily, the same as for some months past.

*Hancock Consolidated*—The location of the permanent vertical shaft which will be sunk to intercept the Pewabic and other lodes has not been decided upon yet. The purchase of the surface rights of the Anthony tract, 200 acres, beneath which the company already owned the mineral rights, will simplify the problem. Super-

intendent John L. Harris has secured as head mining captain John Peterson, who was head mining captain at the Winona mine for several years. Charles W. McDougal is chief engineer. He was formerly with the Quincy. Fred. Schubert, formerly with the Quincy, is surface and construction engineer. There have been several railroad surveys made for the purpose of determining the most advantageous route over which the Mineral Range may build its half-mile spur track. The mine now employs 30 men. As soon as mining starts the force will be greatly increased. A hoisting engine capable of operating to a depth of 2000 ft. is being built at the Lake Shore Engine Works at Marquette.

*Lake Superior Smelting Company*—The old furnaces in the discarded plant at Hancock are being torn to pieces and the copper salvaged. A large quantity of copper remained in the bottom of the furnaces.

*Osceola Consolidated*—William Harris is shipping rock from the Tamarack Junior branch, closed down a few years ago, on a royalty basis. No work is being done underground, but the old burrow pile on the surface is being picked over and the better grade of rock shipped. All the rock lying along the railroad tracks on the property is being carefully scraped up and shipped to the Osceola stamp mills.

*Quincy*—The strike of the men for a 10 per cent. raise in wages was ended this week, all returning to work on the company's terms after three weeks' idleness.

*Superior*—At this mine in section 15, under option to the Calumet & Hecla, the crosscut on the fourth level, 400 ft. below surface, penetrated the Baltic amygdaloid bed. The vein is 40 ft. wide and rich in copper. At the third level drifting is under way north and south, the lode having been opened for a distance of 200 ft. at that depth. Shaft sinking is now under way to the fifth level. At No. 2 shaft, started recently, a depth of 100 ft. has been reached. The lode shows evidence of surface disturbances.

*Wolverine*—Rock shipments have been increased to 1150 tons daily, which is the maximum capacity of the stamp-mill. The yield of refined copper per ton of rock stamped continues high and has shown no diminishment because of the increased shipments.

##### KEWEENAW COUNTY—COPPER.

*Keeweenaw*—A cross section of the lands near the Mandan and Resolute properties has been completed and the diamond drills will be transferred to the Empire tract. A two-compartment shaft has been started on the Medora lode at the Medora property. This formation traverses the company's lands for a distance of 4 miles. It parallels the Greenstone bluff at a distance of 800 ft., and at

a point 900 ft. farther south is located the Montreal river amygdaloid lode.

#### ONTONAGON COUNTY—COPPER.

*Michigan*—Excavating for the foundations of the Michigan's new stamp mill at Keweenaw bay, adjoining the Mass mill, is completed. The foundation will be started as soon as rock can be delivered there from the mine. It is not expected that the plant will be ready for operations for a year at least, during which period the Michigan's rock will be stamped at the Atlantic mill.

#### MINNESOTA.

Iron-ore shipments from this part of the Lake Superior district for August show a falling off from July. Statistics of the three roads that handle the entire iron-ore output of Minnesota are given below for the month of August and for the year to August 31:

Railway.	August.	Eight Mos.
Duluth, Missabe & Northern	1,602,000	6,584,331
Duluth & Iron Range	1,310,779	5,161,722
Great Northern	906,960	3,578,233
Total, 1906	3,819,739	15,324,286
Total, 1905	3,380,261	13,786,735

The first-mentioned road accounts for 1,000,000 tons of the increase in eight months' shipments of 1906 over 1905.

To offset this 1,538,000 tons excess over last year, to this time, the old ranges show a falling off, and none of the Lake Superior districts will do another month's business this year as large as August's.

#### MESABI RANGE.

*Stephens*—At its Stephens mine the Oliver Company is building a town on the waste dump created by stripping the orebody, and all offices and dwellings for its employees will be placed there in due time. Streets have been graded and a number of fine dwellings are going up, for the accommodation of men and families. A large school and a commodious office building are nearly ready for use. Water mains will be laid, the location wired for electric lighting, to be furnished by the mine plant, and every facility given for comfortable residence. At the mine three large shovels have been stripping overburden all summer, and it will be in shape to make a production of more than 1,000,000 tons a year at very low cost in a short time. This mine has never been a producer of much ore, though the company has been getting it ready for several years. It is one of the biggest mines owned by the Oliver company.

*Meadow*—The shaft at the new Meadow mine, at Aurora, is now in taconite, after cutting 60 ft. of ore. This is about the thickness of ore shown by the drill holes upon which the property was sold, but it is hoped that more ore will be proved beneath it and the shaft is being pushed downward.

*New Ore Discovery*—An interesting and important exploration is under way in section 6 T 58-15, Mesabi range, where E. J. Longyear and R. M. Bennett are at

work. It is interesting because not only was ore found in quantity beneath jasper, but beneath a second shelf of jasper. That, in each case, this jasper was found somewhat decomposed is probably the chief reason for the continuance of work into and through the lower shelf. This hole is close to the corner of the northwest  $\frac{1}{4}$  of the southwest  $\frac{1}{4}$  of section 5, within about 100 ft. of the southeast corner of the Syracuse tract, and on the beach of Embarras lake. The drill found 150 ft. of surface, then 10 ft. of decomposed taconite, then 150 ft. of ore, then 15 ft. of taconite and decomposed taconite, and then ore again. The hole is now 40 ft. in this second stratum of ore and has not reached the bottom. Messrs. Longyear and Bennett have secured two additional 40-acre tracts, one adjoining at the north of where they are working, through which Embarras lake runs, and the second cornering on that, to the northeast. Both will be thoroughly explored at once.

Mr. Longyear has for some time been of the opinion that this strike of ore running due east through the north tier of sections in 58-15 is not the main range, but an off-shoot, and that a tongue of granite protrudes easterly, separating this ore from the main formation. This main formation trends off to the northeast, and about a mile and a half north of the north line of 58-15 are the Donora and Stephens mines, both very large and important ore deposits, while other and smaller mines continue the general trend to the northeast. How far easterly this off-shoot pushes ore easterly in the north part of 58-15 has not been accurately determined, but doubtless not all the ore of this subordinate ore-bearing formation has yet been disclosed.

#### MISSOURI.

##### JASPER COUNTY.

*Guinn Land*—The Guinn land, lying north of Webb City, is a tract that a few years ago was a pasture, little thought of as mining property. Many years ago a shaft was sunk and a concentrating plant erected on what is now the Congress mine, but ore in paying quantities was never discovered, the reason being that the shaft was not sunk deep enough. Several different companies tried to make a mine of it, but after spending quite a sum of money they quit. During the last four years some of the best mines in the district have been discovered on this land, all of them laying on the west half of it. The ore is found at a depth of from 180 to 220 ft. and is of sheet formation, as all the mines north of Webb City are. During the last year there has been quite a lot of drilling done on the east half of this land, along the border of the old Nevada lease, with the result that it has become the most important and promising of any of the new ground recently opened up. The drill holes show the existence

of a large body of ore. Eight new shafts are now being sunk and some of them are nearing the orebody, which is first encountered at about 135 ft., a less depth than the mines on the west part of this land.

*Venango Mining Company*—This company, composed of T. C. Jones, of Webb City, and New York and Pennsylvania people, is operating on the Continental tract west of Joplin. It has almost completed a new 200-ton concentrating plant. The company is now drifting in good ore at the 165-ft. level in shaft No. 1 and has another shaft down 135 ft. Both shafts will be sunk to a depth of 200 ft., to the run of sheet ground.

*Kathleen*—Geo. E. Ladd, of the Rolla School of Mines, who has been operating the old Kathleen mine for some time, has announced that he would abandon the mine, as it was worked out. Before he took charge of the mine last year it was thought it was entirely worked out, but he has succeeded in taking out more than 50 carloads of ore at a very fair profit.

*Carter Land*—Geo. H. Davis, who a few months ago secured a lease on the Carter land, two miles northwest of Webb City, last week made the seventh successive drill strike. He has encountered a good run of ore in every hole put down, but this last one is the best, as a well-defined body of zinc and lead ore 12 ft. in thickness was shown between 194 and 206 ft. This land will soon be added to the list of producers.

#### NEVADA.

*Ore Shipments*—Shipments over the Tonopah Railroad for the week ending Aug. 23 were: Tonopah, 2003 tons; Goldfield, 1380; total, 3383 tons. Shipments were light, on account of storms and wash-outs on the roads. Shipments from Tonopah in detail were: Tonopah Company, 1006 tons; Tonopah Extension, 547; Belmont, 250; Midway, 100; Montana-Tonopah, 100; total 2003 tons.

##### NYE COUNTY—TONOPAH.

*Rescue*—A new company, known as the Rescue Consolidated, has been incorporated in Tonopah to develop the Rescue mine. This property adjoins the Belmont, Valley View and Jim Butler, and is believed to contain extensions of the Belmont and Valley View veins. The shaft, which is 400 ft. in depth, has been baled out, and sinking will be continued to 800 ft. depth.

*Home*—The main shaft in this mine has now been sunk to a depth of 450 ft., and it is proposed to continue it to a depth of 500 ft. before crosscutting to cut the vein.

##### NYE COUNTY—JOHNNIE.

*Minnie May*—A carload of rich ore has been shipped to the smelters from this mine from No. 1 lease. The Browne lessees have about a carload of rich ore awaiting facilities for shipping. Tr. No. 1



shaft rich ore is showing, and the mine looks well.

*Johnnie Consolidated*—Work has been resumed on this property under the management of George F. Moser. A large amount of ore is developed, and the mine is expected to become a shipper shortly.

#### NYE COUNTY—MANHATTAN.

*Stray Dog*—The main shaft is being sunk as rapidly as possible to a depth of 200 ft. It has reached a depth of 120 ft. At 200 ft. a crosscut will be run to cut the vein, which on the surface carries some of the richest ore in camp.

*Standard*—At a depth of 35 ft., the shaft in this mine has cut a small fissure vein about 8 in. in width, showing free gold. It is proposed to continue sinking to a depth of 150 ft., and crosscut to catch it at that depth.

*Mother Lode*—A small vein carrying good specimen ore has been located on this property. It outcrops on the surface for some distance. Pannings recently taken from the outcrop average \$75 per ton. Development operations will be immediately resumed.

*Zanzibar*—A tunnel is being run in this mine with the object of intersecting the Consolidated Pine Nut vein. It has pierced the hill for a distance of 300 ft. The best of the tunnel is in quartz showing mineral.

*Consolidated*—Good ore has been opened at a depth of 130 ft.; but it is proposed to continue the shaft to a depth of 200 ft. before opening up the vein.

#### ESMERALDA COUNTY—GOLDFIELD.

*Mohawk*—Rich ore has been struck in a stope from the 160-ft. level by Hayes & Monnette, who are leasing this part of the mine. The vein is about 4 ft. in width, with a rich streak 10 in. wide.

*Velvet*—A 3-ft. ledge has been cut at a depth of 100 ft. in the Pennington lease. Several other lessees are also on good ore.

*Esmeralda*—This mine has been sold for \$100,000 to Hayes & Monnette, lessees on the Mohawk. The new owners are of opinion that the rich vein they are working in the Mohawk runs into the Esmeralda. They propose starting a new shaft on the Clara claim to a depth of 200 ft. The former owners sank a shaft on this claim to a depth of 150 ft., and obtained high assays.

#### ESMERALDA COUNTY—BULLFROG.

*Montgomery-Shoshone*—Tests carried out in Denver on various methods of ore treatment have proved that the Bullfrog ore is best treated by plain milling and amalgamation followed by concentrating and cyaniding. As a result of these tests, the Montgomery-Shoshone Company will at once erect a plant on the mine with a capacity of 400 tons per day.

*Daisy*—A ledge has been cut at a depth of 100 ft. High-grade ore is showing.

## OHIO.

### COLUMBIANA COUNTY.

*Big Vein Coal Company*—This company has let a contract for sinking and timbering the main shaft at the new colliery near Salineville. J. F. Keller, of Massillon, is contractor. The shaft will be two-compartment, about 220-ft. deep.

## OREGON.

### BAKER COUNTY.

*Husselton Placers*—The Husselton placer mines, near Sumpter, 30 miles west of Baker City, were sold for cash to J. W. Wetherill, of Portland, Oregon, this week, but the exact price has not been made public. These diggings are historic and have made annual clean-ups for a number of years.

*Alamo*—John R. Cassin, of Spokane, who is the part owner of the Alamo mine in the Granite district, 35 miles west of Baker City, has completed arrangements for the reopening of the property under the direction of engineer W. W. Elmer and the superintendency of Mr. Pierce. Development work on a large scale will be begun at once.

*Thompson Mine*—C. W. Thompson, operating a group of quartz claims in the Durkee camp, adjoining the Gold Coin property, 35 miles southeast of Baker City, is erecting new machinery and says that he will push development during the winter and hopes to have the orebodies sufficiently uncovered next summer to justify the erection of a stamp mill.

*Sanger*—At the Sanger mine, 25 miles east of Baker City, Manager J. K. Romig is putting a large force of men at work in preparation for the big electric power plant which will be operated by water power from Eagle river. This plant will furnish power not only for the Sanger group, but all the mines east of Baker City, with power to spare for factories in Baker.

*Mountain View*—This mine in the Cable Cove Camp, about 26 miles west of Baker City, the property of H. M. Cake and associates, of Portland, comes out of the season with a large amount of development work done and considerable new ore blocked out. The company proposes in another season to erect machinery for the reduction of the ore in the mine.

*United Elkhorn*—Manager Edward I. Field, of these mines, under the direction of F. P. Hays, of Philadelphia, owner of the property, is making preparations for the resumption of work on the big tunnel at the foot of the mountain which will be  $1\frac{1}{4}$  miles long, tapping the veins at a depth of 2500 ft. below the apex. In the meantime, work is being pushed on the 400 level.

*Mattoon*—Manager A. W. Butler, of this mine, in the Pocohontas district, 7 miles west of Baker City, is finishing the new stamp mill, and will soon have it in

operation. The entire plant has been constructed in 40 days.

*Ophir*—Manager Tom C. Gray, of these mines, the property of Wheeler & Company, New York, has just completed the erection of their new stamp mill on the property, which is about 30 miles west of Baker City, in the Cable Cove camp.

*Queen of the West*—Development work on this mine, Manager Soderling, is progressing, and their new stamp mill will be ready for operation in a few days. This will make the third new stamp mill in the Cornucopia camp to be put in operation this season.

*Virtue*—This old mine will be reopened in a few days under the management of J. K. Romig and the reorganized company, including several Baker City prominent men. The property is well equipped with modern machinery, erected about a year ago, when the old company turned the property over. It will now be operated by electric power. The mine will be unwatered and the lower levels worked.

*Mormon Basin*—A discovery of ore has been made in the Mormon Basin camp, where 13 claims have been located by George Wagner, of Cripple Creek, and E. S. Platts, of Baker City. The croppings pan free gold.

## PENNSYLVANIA.

### ANTHRACITE COAL.

*Philadelphia & Reading Coal and Iron Company*—This company reports operations for July, the first month of the fiscal year, as below:

	1905.	1906.	Changes.
Earnings.....	\$1,844,998	\$2,151,127	I. \$306,129
Expenses.....	1,834,850	2,131,438	I. 296,588
Net earnings....	\$10,148	\$19,689	I. \$9,541

The expenses reported this year were 99.1 per cent. of the gross earnings.

*Girard Mammoth Coal Company*—This company has been organized at Shenandoah, to open a colliery on lands adjoining the Cambridge colliery at that place. The incorporators are Timothy Cockill and Henry K. Christ, Mahanoy City, Penn.; J. Pierce Roberts, David R. James, John R. James, B. F. James and W. J. James, Shenandoah.

*Everhart*—The mining rights on this tract of land in Sugarloaf and Black Creek townships have been leased to W. R. McTurk, of Philadelphia. The tract is owned by the Black Creek Lumber Company. The tract is five miles from Conyngham, where Mr. McTurk now operates a colliery. According to the terms of the lease the lessor company is to be paid \$20,000 at the time of the execution of it and royalties will be paid as follows: 35c. per ton for sizes larger than pea; 20c. per ton for pea; 10c. per ton for buckwheat; 5c. for sizes smaller than buckwheat. It is specified in the lease that the lessees have the right to use so much of the sur-

face for railroad switches, shafts, air shafts, breaker mine buildings, dwelling houses for employees, culm dumps, etc., and the right to dig, mine and remove any and all coal.

### SOUTH DAKOTA.

#### CUSTER COUNTY.

*Bismuth Property*—A carload of bismuth ore has been shipped to be concentrated, and the concentrates will afterward be shipped for treatment. The ore is a quartz, containing native bismuth and bismuthinite. The property is located on Iron creek, and several good veins of ore have been discovered, though as yet the actual value of the ore has not been determined. It is the plan of the company very shortly to erect a concentration plant.

*Extreme*—This property has just been sold at receiver's sale to D. W. Webster, trustee. The consideration was the whole of the claims against the company.

#### LAWRENCE COUNTY.

*Reliance*—The annual meeting of this company was held Aug. 20. About 2,800,000 shares of stock were represented, but some of the directors were unable to be present and the meeting for the election of officers was postponed. The new mill on Annie Creek will be running in a few weeks.

*Columbus*—The stockholders of this company are practically unanimous in concurring with President Sauntry in the recommendation for the purchase of the property of the Hidden Fortune to be paid for with \$230,000 of this company's bonds and 2,000,000 shares of stock.

*Branch Mint*—The 700-ton mill which this company is erecting will be ready to run in a short time, and the work of breaking down ore and filling the ore-bins at the mine, preparatory to starting the mill, has commenced. A slimes plant for the treatment of the slimes by decantation is being built and will contain 19 tanks.

*Gilt Edge Maid*—After a shut down due to the breaking of the crusher the mill is again running and treating from 175 to 180 tons of ore daily. There is an unusual amount of moisture in the ore, so that the mill can not be run at its full capacity of 200 tons. Four open cuts show an ore exposure of 80x270 ft., and a large supply of ore is opened up.

*Custer Peak*—Preparations are being made to resume work on this property in about a month. There is some excellent copper ore and a large vein has been cut in the 200-ft. shaft. The shaft will be sunk to the 500-ft. level, when crosscutting will be begun. Copper ore is especially valuable here as it is needed for fluxing at the smelters.

#### PENNINGTON COUNTY.

*Mariposa*—This company has just installed a complete electric equipment.

Leyner drills and a Leyner air compressor. A vein a few inches wide on the surface has widened out to 4½ ft., at a depth of 100 ft. A tunnel is being run to tap the main vein at the 500-ft. level.

*Clara Bell*—The new working shaft has reached a depth of 200 ft. and it will be continued 50 ft. farther to tap the vein. This shoot varies from 18 in. to 20 ft. in width. The 40-ton mill is almost completed. The process will be amalgamation and cyaniding. Only the sands will be treated at present, but later experiments will be made looking toward a successful handling of the slimes. At present only 10 per cent. runs into slimes.

*Standard Smelter*—Fire broke out in this plant at Rapid City, burning 30 ft. of trestle, three ore bins and a car of limestone on the tracks. The loss was about \$2000. Only one stack was closed on account of the fire, and that for only a few days.

*Standby*—It is expected to start the stamp mill, dropping 20 out of 60 stamps, the first of September. The mill has been remodeled, the flume repaired, new tracks laid between the mine and the mill, and abundant development work done. Several valuable new orebodies have been uncovered. The ore is low grade, but free milling, and will be treated by amalgamation. Conditions at the mine and mill are such that a record for the low cost of treatment of ores is expected.

### TENNESSEE.

The governor and State prison commissioners are engaged in the inspection of coal lands in Fentress Cumberland, Van Buren, Bledsoe and Sequatchie counties with a view to purchasing lands for working the State convicts. The lands are to be purchased in accordance with an act of the last General Assembly of Tennessee, authorizing the purchase of 15,000 acres. It is understood that not less than 7500 acres will be purchased in a tract.

#### CUMBERLAND COUNTY.

*Waldensia Coal Company*—This company has taken over the property of the Chicago-Tennessee Coal and Coke Company near Waldensia. This includes 2000 acres of land, on which there is a coal mine in operation and 60 coke-ovens. H. C. Thompson, of London, Ky., is head of the new company.

#### PUTNAM COUNTY.

*Obey River Coal Company*—The property of this company, near Monterey, has been leased to F. J. Fuller, of Nashville, and E. L. Hampton, of Tracy City, Tenn. The lease is on a royalty basis. The lessees will develop this property, and will have their headquarters in Nashville.

#### SCOTT COUNTY.

*Scott County Coal Company*—It is announced that B. A. Treat, of Harriman, Tenn., has purchased the mines of this

company, near Helenwood, and will soon begin operations on an extensive scale.

### TEXAS.

The gross output of the Gulf coast fields declined 150,000 bbl. in July, so while shipments increased, Texas fields held up well, only showing a decline of 20,000 bbl. Nothing tending to show a prospect of any new field developed during July, and the decreasing output and consequent decline in stored oil caused an advance in crude prices for all fields. Further advances are expected and contract prices range from 4 to 5c. per bbl. above credit prices quoted below. The average prices paid for Texas crude during the first half of 1906 show an increase of over 15c. as compared with 1905. Credit prices and production are as follows: Sour Lake, 6,400 bbl.; 54c. Saratoga, 7,600 bbl.; 47c. Batson, 7,300 bbl.; 46c. Humble, 12,500 bbl.; 51c. Spindletop, 2,500 bbl.; 69c. Jennings, 20,660 bbl.; 40c.

The well summary for July shows 66 producers and 16 dry holes; with 60 wells under drill at the end of the month.

#### JEFFERSON COUNTY.

*Beaumont*—The total gross daily output of coastal fields, on August 15, showed a production of 57,500 bbl., an approximate gain of 3200 bbl. over July 31. Texas fields declined 3500 bbl., while Jennings increased from 17,500 bbl. to 24,200 bbl. Practically all the Texas fields show a decreased output, with Saratoga holding up best and Humble having the largest decline. Crude prices are firm with available stored oil becoming scarcer, and, unless a new field is located before 1907, crude for fuel purposes will go to a price that will induce manufacturers to use coal again. Estimated output and contract prices on Aug. 15 are as follows: Humble, 9850 bbl., 53c.; Saratoga, 7500 bbl., 55c.; Spindletop, 2500 bbl., 65c.; Batson, 6900 bbl., 55c.; Sour Lake, 6000 bbl., 62c.; Jennings, 24,350 bbl., 54 cents.

#### WELL SUMMARY, AUG. 1 TO AUG. 15.

	Compl'd.	Produ'g.	Dry.	Drilling.
Humble.....	13	6	7	14
Batson.....	3	3	0	7
Saratoga.....	4	4	0	7
Sour Lake.....	3	2	1	6
Spindletop....	2	0	2	9
Jennings.....	2	2	0	9
	27	17	10	50

#### MILLAM COUNTY.

*Rockdale*—The machinery for the briquetting plant at Witcher station is being installed and the plant will likely be operating in 60 days.

### UTAH.

#### BEAVER COUNTY.

*Frisco Contact*—Ore has been encountered in a crosscut run from the bottom of the shaft, which is believed to be an extension of the Horn Silver ledge.

*Indian Queen*—The adit has made connection with the orebody and with the old shaft workings. L. N. Morrison, of Salt Lake City, is manager.



*Skylark*—An Eastern syndicate is said to have purchased a large interest in this copper property and will equip it with new machinery. A. J. McMullen, of Salt Lake, is manager.

## JUAB COUNTY.

*Mammoth*—Considerable rich ore is being taken from the 1300 and 2260 levels.

*Tetro*—The crosscut from the new shaft has encountered an orebody on the 500-ft. level. The vein is about 20 ft. wide, mostly mill ore.

## MORGAN COUNTY.

*Carbonate Hill*—The management says the property of this corporation will soon be in condition to produce 500 tons of silver-lead ore monthly. Preparations are being made to install an air compressor. The company recently declared a stock dividend, a move preparatory to an increase of the capital stock.

## PIUTE COUNTY.

*Gold Development*—This company has resumed development on its properties in the Gold mountain district. M. F. Murray, of Richfield, is manager.

## SALT LAKE COUNTY.

*Bingham Central*—The upper, or Whitley tunnel, has penetrated one of the copper-bearing fissures, which will likely supply a large tonnage of mill ore.

*Utah Apex*—Copper ore of good grade has been opened by the extension of the Andy tunnel. This property is getting in shape to produce extensively. The aerial tramway is nearing completion.

## SUMMIT COUNTY.

*Silver King*—The shaft at this property is down 1100 ft., and the bottom is in a well-mineralized formation.

## TOOELE COUNTY.

*Cyclone*—On the 800-ft. level a good body of mill ore has been crosscut for 11 ft. The mine is at Stockton.

*New Stockton*—The first sulphide ore of any consequence has been found on the 1000-ft. level of this mine.

## WISCONSIN.

*Kennedy Mine*—Messrs. Spensley and McIlhon, two of the owners of the Kennedy mine, have concluded to equip the new shaft with an electric hoist to be used in raising ore.

*Platte Lead and Zinc Company*—The development work at the Platte mine is being energetically pushed and it is reported that the mine will soon be shipping ore. The indications are that the body of ore located by the drill is extensive.

*Klar-Piquette Mining Company*—It is reported that the Klar-Piquette is in the market for a modern concentrating plant. The property is one of the first of the recent drill strikes to get ready for a plant. There is an extremely good showing of high-grade ore on the dumps and the

character of the formation is said to warrant the erection of a mill at once.

*Ex-Calibre Mining Company*—The Ex-Calibre is in the market for an 8-in. double crosshead, lift pump, to be erected at their shaft, which is being put down on the Kamm property. This property was drilled thoroughly and the cuttings are reported as being above the average.

*Frontier Mining Company*—Mr. Randall, who is heavily interested in the Frontier at Benton camp, is making arrangements to install some first-class machinery. The strike in the drill hole that was put down in the bottom of the main shaft is the best that has been made at Benton for some time. It is the intention of the management to go to work systematically just as soon as the new apparatus is installed. Preparation is being made to meet a heavy body of water, as the drill hole is flowing well at the present time, indicating some hard pumping in the future.

*Preston Point Lead and Zinc Company*—In spite of the fact that at one time the Preston Point property was abandoned it now seems that the present company is going to prosper. The new plant has been in operation for two weeks and has been averaging five tons daily of high-grade zinc ore from clean-up dirt. It is said that as soon as ore from the face is run through the mill, the tonnage will be doubled.

*Krog-Webster Mining Company*—The starting of the Krog-Webster has been delayed owing to an accident to the Corliss engine. This property is said to be in good shape to obtain dirt for the mill. Mining men are watching the output closely, as it is in a territory that should be quite productive, since a great deal of lead has been taken from there in former years.

## Foreign Mining News.

## CANADA.

## BRITISH COLUMBIA—AINSWORTH.

*Krao*—In this mine, at the 100-ft. level, there is now in the drift north from the shaft a width of 13 ft. of shipping ore including 4 ft. carrying high values in native and ruby silver. Some 40 tons of ore, estimated to average 200 oz. of silver per ton, are awaiting shipment.

*United Mine*—A crosscut on the 150-ft. level has encountered 4 ft. of ore that will run 50 oz. silver per ton. There are 150 tons of ore ready for shipment. This mine and the neighboring Glengarry were worked for some time by the Canadian Metal Company which, before relinquishing its option on them, shipped 400 to 500 tons of ore taken out in the course of development.

*Spokane and Trinket*—These claims are being worked under lease by Geo. H. Barnhart, of Nelson, after having been idle for eight or nine years. The lead

crossing them is a bedded vein in schist, and has been traced on the surface for about two miles, the ore occurring in lenses and shoots. It is a solid coarse-cube galena, the paysteak varying in thickness from 3 to 24 in. The ore shipped by the company owning the property gave a return of 60 to 70 per cent. lead and an average of 30 oz. silver per ton.

## BRITISH COLUMBIA—EAST KOOTENAY.

*St. Eugene Mine*—During six months ended June 30, last, the production of this mine was: Ore milled 84,066 tons; concentrates produced 14,008 tons; crude ore shipped to smelter 1489 tons. The gross value of the shipping product of the St. Eugene last year was \$52.93 per ton. After deducting all freight, smelting, refining and marketing charges, the net amount received by the company, including the bounty on metallic lead paid by the Dominion Government, was \$35.85 per ton. Mine and smelter are now owned by the same company, not by different companies as was the case last year.

## ONTARIO—MANITOU DISTRICT.

*Pritchard Location*—This property near the Redeemer mine is being examined by Walpole Roland, of Port Arthur, in the interests of Buffalo capitalists.

*Glass Reef Gold Mining Company*—This mine, on Lower Manitou lake, has been closed down for over five years. It formerly employed 84 men. Secretary-Treasurer E. H. James is now examining conditions at the mine, to ascertain whether it can profitably be reopened.

*Laurentian*—Development work is being vigorously carried on by double shifts. The shaft is down 270 ft. and a sump and skip have been put in at the 200-ft. level, with all necessary plant for handling the ore. Crosscuts of 230 ft. at that level have tapped rich orebodies. Samples of ore taken from the 80-ft. level include chalcopryrites carrying high sulphur contents which are seamed with gold. The pyrites and low-grade ore will be handled as a free-milling proposition. A 20-stamp mill is in operation, but so far has only been working on the ore removed in development.

## YUKON TERRITORY.

A report has been received from Superintendent Snyder of the Mounted Police at White Horse, that quartz mining has received a great impetus from valuable new discoveries in the Watson and Wheaton river districts, at various points from 15 to 25 miles southwest of Robinson Siding on the White Pass & Yukon railway. Samples of ore brought in are said to range high in gold. Rich float has been found in this area since 1898, but only during the present year has gold been found in the ledges. Many claims have been staked and sold at all sorts of figures, and application has been made for a townsite at the mines and another at Robinson Siding.

*Comad Consolidated*—This company has about 200 hands at work in its various claims and was preparing to make large shipments of ore to the smelters during August. They had about completed a second aerial tramway to the Venus mine.

*Pueblo Copper Mine*—Extensive mining is being done on this property, five miles from White Horse, and the company expects to ship 1000 tons of ore during the summer and fall.

*Livingstone Creek*—The placer mines are being actively worked, 1025 oz. gold being brought to White Horse during one week from this district.

## MEXICO.

### JALISCO.

*San Pablo and San Rafael Mines*—These mines, some five miles south of Etzatlan, and practically adjoining the Santo Domingo mines of the Amparo Mining Company, are to be operated by the San Pablo Mining Company, organized by Makeever Bros., of New York, with a capital of \$2,500,000 gold; J. L. Makeever as president. The San Pablo was obtained by the Makeevers last February from W. M. Mathews for \$150,000 Mexican, and the San Rafael has been added more recently. It is understood that the company has just closed the deal for the purchase, at \$150,000 Mexican, of El Favor mine, adjoining the Tamara y Anexas of Carlos Romero, in the Hostotiquillo district, about 30 miles north of Etzatlan, for which negotiations have been pending for some time. On this property a 1500-ft. tunnel is being driven to cut the vein, and when that is encountered a 40-stamp mill and cyanide plant will be erected. Frank G. Stevens, formerly with the Santo Domingo, will be the superintendent of all the San Pablo company's interests.

*Santo Domingo Mine*—The Amparo Mining Company, of Philadelphia, obtained this property several years ago at something like \$300,000 Mexican, after it had been turned down by several prominent engineers. The promoters were said to be laughing in their sleeves at selling what was thought to be only a shell of a once golden egg. When the company did take hold, it found practically nothing in the old vein, from which immense bodies had been taken, for the workings show what a fine old property it once was. Naturally one of the first things that was done was to send out crosscuts, and in less than 20 ft. in the hanging a previously unknown vein was encountered which from the beginning has proven a bonanza. Many improvements have been made, a three-compartment shaft has been sunk, and now a 14-km. (9 miles) narrow-gage road is to be built, at a cost of about \$200,000 Mexican, from the mine down to Aqualulco. At that place a 90-stamp concentration and cyanide mill, costing close to \$300,000

Mexican, is to be built. Much credit is due Superintendent Ferdinand Sustersic for what has been here accomplished.

*Magistral y Anexas*—L. H. Taylor has bought of the Dwight Furness Company, of Guanajuato, or is negotiating for, this mine, 12 miles southwest of Ameca and near his own property, Las Moras. The latter has been developed and largely worked out to the water level, but with the two properties under his control, he will continue his work below the water level. Colin Timmons, of Los Angeles, will be in charge of both.

### SONORA.

*Douglas Copper Company*—This company has just placed with the Ingersoll-Rand Company an order for a cross-compound, high-speed, two-stage air compressor, having a capacity of 3700 cu.ft. of free air per minute. This is one of the largest compressors on the west coast of Mexico and is to be located at No. 1 shaft of the company's El Cobre property in Sonora, Mexico. There is also to be installed a second battery of boilers and condensing machinery. This, together with the 250 h.p. hoist built by the Risdon Iron Works, of San Francisco, which went into commission in June, makes the surface equipment at this shaft ample and up-to-date. Theodore Douglas is now on his way West to close a contract on the Pacific Coast for the building of five 110-h.p. traction engines and 25 ore trucks to operate between El Cobre and the smelter.

*Bolanon*—The preparations for unwatering these old mines, near Cototlan, have caused the owners of the Anita mines to consider the advisability of resuming operations, which if done will no doubt include the renovating and blowing in of their 40-ton blast furnace.

*San Rafael*—This mine, in the Tapalpa district, of 112 pertinencias (280 acres) is reported sold by J. F. Graham to the Mercer-San Rafael Mining Company, of Mercer, Penn. It is stated that work will be pursued to some purpose.

*Gavilan*—This mine, in the Tapalpa district, is showing up some excellent bodies of zinc ore.

### ZACATECAS.

Considerable activity prevails about the city of Zacatecas. The copper developments of the last five years are attracting attention. The deepest working in the copper producers will not exceed 125 m. Only in one mine is systematic development, according to modern methods, being carried on. The others are operated by "gouging," "coyoting," and hand-to-mouth primitive practices. Whenever owners accept reasonable prices for their copper showings Zacatecas will assume rank as an important producer of the metal.

*Norris-Gilbert Group*—A shoot of shipping ore has recently been opened up in this property in the lowest level. The

average width reaches two m. and the length of the exposure some hundred meters. Only little sorting is performed, the ore as it arrives at the Torreon smelter assaying 6 per cent. copper, with some 200 grams of silver. Over 250 burros are employed in freighting the ore from the mine to the Mexican Central, a distance of three miles.

*Tajos de Panuco*—To expedite the unwatering of this famous silver mine, John P. MacEwen, manager, has decided to utilize another ancient shaft. In the first shaft constant caves occurred, as the lowering of the water exposed the decayed timbering. To permit repairs being made, the water level will be maintained through the second shaft. All indications, so far, respecting the existence of large ore-bodies are encouraging. Quantities of yellow fines exist in the old open cut. Desiring to determine values, the manager cut a sample, and obtained assay values of 500 grams per metric ton. Since the tonnage is apparently large, this asset is worthy of being included in the mine's resources.

*San Rafael*—This group, producing millions of ounces of silver in the past century, is owned at present by El Grande Mining Company. Mr. Stilwell, promoter of the Kansas City, Mexico & Orient railroad, controls the organization. Operations are being conducted under the immediate management of J. M. Pirscher, mining engineer. James W. Malcomson, acting as consulting engineer for the Stilwell interests, pays occasional visits to the property. After a period of idleness, mining was resumed some months ago. A new steam hoist was installed and drainage begun by means of bailing. Upon recovering the bottom of the mine, a search for new ore-bodies was undertaken. Because of the quality of the virgin territory existing above the lowest workings, all expenditure is concentrated upon lateral exploration. Results thus far are encouraging. Only the high-grade ore assaying 2 kg. and more in silver per ton is sold to the Aguascalientes smelter. Rejected material is being stored for future treatment. When the proper process is decided upon, thousands of tons will be available, including the dump accumulated during the Mexican regime. Owing to the employment of Mexican labor almost exclusively, the payroll is low.

## AFRICA.

### RHODESIA.

In addition to the gold heretofore reported, the mines of Rhodesia produced in the seven months ending July 31 a total of 55,887 oz. silver, a decrease of 1311 oz.; and 353 tons of lead, a decrease of 2 tons from last year. The production of coal from the Wankie mines was 47,045 tons in 1905, and 66,243 tons in 1906; an increase of 19,198 tons for the seven months, this year.



AUSTRALIA.

TASMANIA.

*Mount Lyell*—The 700-ft. level south and leading stopes of the North Mount Lyell mine are showing fine faces of ore. Rich ore is being broken from the leading stopes for a width of 20 ft. Good ore is also showing in the 600-ft. workings. The main tunnel in the Mount Lyell Blocks is in 1730 ft., and in No. 3 raise a copper-bearing formation is being entered. It is believed that an extension of the orebody from which rich ore was taken from the 450-ft. level in the main shaft is being approached.

WESTERN AUSTRALIA.

*West Kimberly*—Considerable interest is centered in recent reports of rich finds on the Narlarla gold field. This district was prospected many years ago, before the Coolgardie and Kalgoorlie fields were discovered and some rich mineral finds were made; but prospectors could not remain in the district, owing to its remoteness, and the consequent difficulties in securing food supplies. Recently, however, some wealthy syndicates fitted out prospecting expeditions and despatched them to work over the district again, with the result that their reports were of a favorable nature. Companies are now being formed to take up large areas of land for gold and copper mining purposes and the Government has despatched an engineer to report on the district, which is in the northern part of the State.

*Phillips River*—An English company has purchased the copper smelter recently erected by the Government at Phillips river, and has acquired copper mines embracing an area of 350 acres. The company will work on an extensive scale. A large force is now being put on to develop the mines. G. C. Klug, late general manager of the Great Boulder Perseverance mine, Kalgoorlie, has been appointed superintendent of the mines.

EUROPE.

BELGIUM.

The long controversy over the new Campine coalfield has been settled for the present, the Government having granted a concession for the exploitation of the coal to the Société Eelen-Asch. The concession covers an area of 2950 hectares, or about 7000 acres.

Coal Trade Review.

NEW YORK, Sept. 6.

Shortage of car supply continues to be the complaint from all sections. In the East, however, demand is not sufficiently strong to make lack of cars keenly felt, and even in the lake trade the transportation facilities on land appear equal to those on the water.

Coal buying is remarkably dilatory; in the East, soft-coal consumers are behind

their contracts, while anthracite is stagnant. In the West, although coal is in good supply, there is but small demand.

COAL TRAFFIC NOTES.

Shipments of coal and coke over the Chesapeake & Ohio Railroad during its fiscal year ending June 30, 1906, were as follows, in short tons:

	Coal.	Coke.	Total.
New River.....	5,746,089	310,733	6,056,822
Kanawha.....	3,120,667	104,097	3,224,764
Kentucky.....	108,230	.....	108,230
Connecting lines...	439,912	55,145	495,057
Total.....	9,414,898	469,975	9,884,873
Total, 1905.....	7,796,461	313,384	8,009,845

The increase this year was 1,618,437 tons of coal and 156,591 tons of coke, a total gain of 1,875,028 tons, or about 20 per cent. Deliveries this year were: To points west of mines, 1,182,527 tons coal and 166,736 tons coke; to points east of mines, 949,242 tons coal and 143,997 tons coke; to tidewater, 3,614,320 tons of coal.

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the week ending Sept. 1 were 15,166 tons and for the year, to same date, they were 506,820 tons.

The coal and coke traffic originating on all the lines of the Pennsylvania Railroad east of Pittsburg and Erie, for the year to Aug. 25, was as follows, in short tons:

	1905.	1906.	Changes.
Anthracite.....	3,015,167	2,776,779	D. 238,388
Bituminous.....	18,476,500	20,321,095	I. 1,844,595
Coke.....	7,091,399	8,150,554	I. 1,059,155
Total.....	28,583,066	31,248,428	I. 2,665,362

The total gain this year over 1905 was 9.3 per cent.

Nova Scotia coal shipments, by companies, are reported as follows for the seven months ending July 31, in long tons:

	1905.	1906.	Changes.
Dominion Coal....	1,499,772	1,748,887	I. 249,115
N. S. Steel.....	288,963	336,605	I. 47,642
Cumberland.....	222,587	251,180	I. 28,593
Intercolonial.....	102,953	163,720	I. 60,767
Acadia.....	140,861	144,403	I. 3,542
Inverness.....	70,090	92,160	I. 22,070
Total.....	2,295,226	2,736,955	I. 441,729

The total increase was 19.3 per cent. All the companies showed gains over last year.

New York. Sept. 5.

ANTHRACITE.

The situation in the hard-coal market still remains in a dormant state. The conditions at the mines are good and the supply is well in advance of the demand. Labor troubles are about over and the operators are now waiting for business to pick up, and fall orders are expected to begin soon unless weather conditions should prove unsatisfactory from the producers' standpoint. The usual monthly advance has taken place and prices are: \$4.75 for broken and \$5 for egg, stove and chestnut. In the steam sizes we quote \$2.80@3 for pea; \$2.25@2.50 for buck-wheat; \$1.45@1.50 for rice; \$1.30@1.35 for barley; f.o.b. New York harbor shipping points.

BITUMINOUS.

In the soft-coal trade, there is nothing new to report. The supply is far in excess of the demand and the disposal of the coal is troubling operators. The car supply still remains a little under the demand. In the far East and along the Sound consumers are not taking their full monthly proportion of coal as called for by contract.

Prices in New York harbor are low and the supply is very good. We quote good grades of Pennsylvania coal at \$2.50 @2.60, with West Virginia coals at \$2.25 @2.40, f.o.b. New York harbor shipping points. Vessels in the coastwise market are not in good supply, but in consideration of the fact that consumers are short on their contracts this does not affect the situation to any extent.

We quote freight rates as follows: Boston, Salem and Portland, 65@70c.; Providence, New Bedford and the Sound, 55c.; Lynn, 80c.; Newburyport, 85c.; Portsmouth, 70@75c.; Bath, 75c.; Bangor, 80@85c.; Saco and Gardiner, 85@90c., and towage.

Birmingham. Sept. 3.

Operations in Alabama are still active and output is increasing right along. The most interesting announcement of the past week was that the mining companies had declined to give employment to the union miners who were on strike for two years and longer, and who recently decided to call off the strike. The statement was made that the cause for the furnace companies declining to receive the union miners back into their mines was the fear that the labor now at work might be disturbed by an effort to organize the men. Considerable foreign labor is still being brought into the district. The district board of the union miners' organization threatens to send the union men, who cannot secure work in the mines, out of the district to States where there is a need for labor. The union miners' organization during the strike sent considerable labor brought in by the mining companies back to its starting point.

The demand for coal is good and there seems to be need for every ton of coal mined. Coke is in strong demand. Reports that the coke supply will not warrant the blowing in of additional furnaces is not verified. The short supply appears to be in ore instead of coke. The coke supply is improving, too, as new ovens are completed and put into operation.

Chicago. Sept. 4.

There are no signs yet of a revival of the wholesale coal trade. The dulness of summer continues for both bituminous and anthracite, the end of the discount season—Sept. 1—bringing no appreciable increase in the buying of anthracite. Users of steam coal are turning more to prepared sizes and run-of-mine, which makes

screenings less in demand and consequently lower in price. Eastern bituminous is reported to be troubled by inadequate car service, and supplies to this market are short. There is no great shortage of cars, though shipments of practically all coals are cut down almost to the point of preventing demurrage slumps in prices.

Illinois and Indiana bring \$1.80@2.30 for lump, \$1.50@1.80 for run-of-mine and \$1@1.50 for screenings. Smokeless, Hocking and Youghiogheny are all reported selling well and holding firmly up to circular prices.

#### Cleveland. Sept. 4.

The movement of coal up the lakes has been comparatively free during the past week. Boats have not been in such active demand by ore and grain shippers, consequently there has been a better supply for the coal trade. There have not, however, been enough boats to take care of the needs of the shippers and it has been necessary to pay an advance over slow docks and to the smaller ports. The wild rates generally hold at 50c. to Lake Michigan and 40c. to Lake Superior.

The activity of the lake trade has shortened the supply of cars in the strictly local trade. This has produced a shortage of coal for the time being, and the prices have been strong. Mine-run quality of steam coal has been selling around \$1 a ton at the mines, both in the Ohio and Pennsylvania territory. Slack is in strong demand, regardless of the increased volume of it, due to the heavy movement of lake three-quarter coal. The price has held around 75@80c. at the mines. The coke market is exceptionally strong. Material for spot delivery is hard to obtain and only a few ovens are willing to make contracts for 1907 delivery. The best grade of 72-hour foundry coke is selling at \$3.50 at the oven and furnace coke is selling at \$2.90@3 at the oven.

#### Indianapolis. Sept. 1.

For the first time in many years the coal-supplying business in Indiana is split to pieces and competition is to be brisk this season. There are a number of new mining companies and the struggle for business and orders has begun. A good many orders are coming in and the competition will grow as the winter orders increase. The price of coal promises to advance during this winter, as usual, and an advance is already noted since mid-summer.

Action was taken last week by the State Railroad Commission which will lift a blockade of loaded coal cars that has existed at Terre Haute for some time. The blockade is the result of a disagreement of connecting roads over the manner in which coal was to be delivered from one road to the other. The mine operators took a hand in the dispute and appealed to the commission, which soon brought

the managers of the roads to a resumption of former relations and the cars began to move.

Indiana coal operators say that buyers are holding back, in the hope that the recent advance in the price of coal is only temporary, and that by delaying they will be able to obtain old terms. This is thought to be a mistake, and those who heretofore stocked up in August will undoubtedly find themselves in an unpleasant predicament when they get ready to place their orders. There is every ground for the belief that the car shortage already prevailing on some roads will continue, and that another month will develop such a stringency in the car supply that orders will be filled with difficulty.

The executive board of the United Mine Workers of Indiana held a meeting at Terre Haute, Aug. 24, with a committee supposed to represent the engineers, who are complaining about conditions. The engineers wish to organize separately, but President Mitchell will not authorize it. The operators are taking no part in the present trouble and are waiting for the miners' organization to establish its authority. The operators, however, will stand by the miners' organization and will not employ members of the proposed separate engineers' union.

#### Pittsburg. Sept. 4.

**Coal**—The car shortage in the Pittsburg district is more pronounced than at any time in several years. During the past week not more than 40 per cent. of the requirements of cars were received and production in the railroad mines is lower than at any time this year. As a result, prices are firmer and \$1.10@1.15 a ton for mine-run coal is only quoted on large contracts. The demand continues good, but shipments to the lake ports for the Northwestern markets are greatly curtailed.

**Connellsville Coke**—There has been no material change in production and shipments, the demand and supply being uniform and prices are about the same as a week ago. Furnace coke is quoted at \$2.75@2.80 and foundry at \$3@3.15 a ton. The production for the week, according to the *Courier*, was 278,169 tons and the shipments 13,861 cars, distributed as follows: To Pittsburg and river points, 4749 cars; to points west of Pittsburg, 7145 cars; to points east of Connellsville, 1967 cars. The production in the lower Connellsville region amounted to 111,597 tons.

#### Foreign Coal Trade.

##### Sept. 5.

Exports of coal and coke from the United States for the seven months ending July 31, 1905 and 1906, are reported by the Bureau of Statistics of the Department of Commerce and Labor as follows:

	1905.	1906.	Changes.
Anthracite.....	1,417,789	1,253,411	D. 164,378
Bituminous.....	3,824,452	4,077,236	I. 252,784
<b>Total coal.....</b>	<b>5,242,241</b>	<b>5,330,647</b>	<b>I. 88,406</b>
Coke.....	342,126	435,377	I. 83,251
<b>Total.....</b>	<b>5,584,367</b>	<b>5,766,024</b>	<b>I. 171,657</b>

Mexico is the largest consumer of our coke. The disposition of the coal was this:

	1905.	1906.	Changes.
Canada.....	3,930,143	3,878,821	D. 51,322
Mexico.....	540,823	650,763	I. 9,940
Cuba.....	283,598	398,677	I. 115,079
Other W. Indies.....	181,367	204,599	I. 23,232
France.....	651	1,866	I. 1,215
Italy.....	51,771	42,351	D. 9,420
Other Europe.....	15,860	17,885	I. 2,025
Other countries.....	238,038	135,685	D. 102,353
<b>Total.....</b>	<b>5,242,241</b>	<b>5,330,647</b>	<b>D. 88,406</b>

Canada took, this year, 72.7 per cent. of the total shipments of coal. The shipments to Canada, in detail, were:

	1905.	1906.	Changes.
Anthracite.....	1,398,252	1,227,686	D. 170,566
Bituminous.....	2,531,891	2,651,135	I. 119,244
<b>Total.....</b>	<b>3,930,143</b>	<b>3,878,821</b>	<b>D. 51,322</b>

Imports of coal and coke into the United States for the seven months ending July 31 were as follows:

	1905.	1906.	Changes.
Canada.....	753,643	916,812	I. 163,169
Great Britain.....	27,526	76,652	I. 49,126
Japan.....	39,058	11,726	D. 27,332
Australia.....	85,898	112,065	I. 26,167
Other countries.....	152	4,158	I. 4,006
<b>Total coal.....</b>	<b>906,277</b>	<b>1,121,413</b>	<b>I. 215,136</b>
Coke.....	16,197	79,046	I. 62,849

Practically all the coke comes from British Columbia, with a little from Germany. The Pacific coast receives most of the coal, but a little comes into New England from Nova Scotia. Anthracite constituted 11,909 tons of the total this year.

#### Iron Trade Review.

##### NEW YORK, Sept. 5.

The iron industry throughout the country is in a state of tremendous activity. Orders for crude materials are booked for months ahead, and it is impossible to get anything delivered promptly without offering a substantial premium.

Finished materials are under orders for delivery as far ahead as July, 1907, and although manufacturers are in pressing need of rolled iron and steel, the principal producers are not assisting in any violent advance in prices. The conditions of trade at the largest centers are shown in the letters that follow.

**Exports and Imports**—Exports of iron and steel, including machinery, from the United States during the seven months ending July 31, 1905 and 1906, are valued as below by the Bureau of Statistics of the Department of Commerce and Finance:

	1905.	1906.	Changes.
July.....	\$11,086,643	\$12,766,212	I. \$1,729,569
Seven months...	78,205,937	97,989,978	I. 19,784,041

The gain for July was 15.7 per cent., and for the seven months it was 25.3 per cent. The chief items of the iron and steel



exports for the seven months were as follows, in long tons:

	1905.	1906.	Changes.
Pig iron.....	31,541	46,477	I. 14,936
Billets, ingots & blooms	106,663	146,503	I. 39,840
Bars.....	36,018	54,435	I. 18,417
Rails.....	155,194	203,852	I. 48,658
Sheets and plates.....	45,777	68,788	I. 23,011
Structural steel.....	45,540	62,710	I. 17,170
Wire.....	79,010	98,343	I. 19,333
Nails and spikes.....	29,352	38,142	I. 8,790

All the items show substantial gains. There were no iron rails exported in either year.

Imports of iron and steel, including machinery, into the United States in July and during the first seven months of 1905 and 1906 had the following values:

	1905.	1906.	Changes.
July.....	\$2,112,557	\$3,287,916	I. \$1,175,359
Seven months.....	15,092,948	18,921,011	I. 3,828,063

The gain was 55.5 per cent. in July and 25.3 per cent. for the seven months. The chief items of iron and steel imports for the seven months were as below, in long tons:

	1905.	1906.	Changes.
Pig iron.....	109,416	184,322	I. 74,906
Scrap.....	7,916	9,961	I. 2,045
Ingots, blooms, etc.....	7,970	11,660	I. 3,690
Bars.....	19,143	29,446	I. 1,303
Wire-rods.....	9,151	10,650	I. 499
Tin-plates.....	40,731	29,130	D. 11,601

The chief gains occurred in the semi-raw materials.

**Iron Ore Movement**—Exports and imports of iron ore in the United States for the seven months ending July 31, 1905 and 1906, were as follows, in long tons:

	1905.	1906.	Changes.
Exports.....	94,036	122,039	I. 28,003
Imports.....	506,418	643,690	I. 137,272

Most of the exports go to Canada, while the principal sources of imports are Cuba and Spain.

Imports of manganese ore for the seven months were 164,358 long tons in 1905 and 127,216 tons in 1906. They come mainly from Russia and Brazil.

**Chicago.** Sept. 4.

The iron market has quieted somewhat, but sales are still satisfactory. For the melter, the difficulty is to find iron for first-quarter needs; orders are now running into the third quarter, though furnace agents profess no desire to contract so far ahead at current prices. There is still an active demand for lots that can be delivered by the end of the current year. Such lots, it is perhaps unnecessary to say, are scarce and command premiums. On regular contract sales, prices remain the same as last week, \$19@19.25 for Northern and \$14.75@15 Birmingham (\$18.65 @18.90 Chicago) for Southern.

The opinion is expressed by some sellers of pig iron that there will be a quiet autumn and winter business, but the weight of opinion is in favor of continued heavy business. General needs of melters are now fairly supplied up to the end of the first quarter of 1907.

Coke is active and strong, with none too great supplies coming forward. Con-

nellsville 72-hour foundry brings \$6 (\$3.35 at ovens) with other cokes ranging down to \$5.15 per ton.

**Birmingham.** Sept. 3.

Pig-iron prices in Alabama are strong and demand is still active in spite of reports that there has been a halt in the buying. There is some buying for immediate delivery and an extra good price is given for this iron. With three months' delivery prices are more liberal, while iron for delivery during the first three months of the coming year can be purchased at from 50c. to \$1 cheaper than the other iron. No. 2 foundry iron, delivery within thirty days (and not to be had in any great quantity), brings something like \$16 per ton. Three months' delivery iron is quoted at \$15.50 straight, while iron for delivery next year is bringing between \$15 and \$15.50 per ton. The statement is made that consumers are holding off buying in the hope of holding down prices. The furnace companies in this section have absolutely no fears as to future conditions. It is announced that some furnace companies have been buying from one another in order to keep up with orders. All iron sold now for delivery within thirty days is commanding a premium. An unverified statement has been made that one of the companies in the Birmingham district is still delivering low-priced iron, and that a loss of no less than \$200,000 has been sustained because of the policy of selling great quantities of iron at low prices. At more than one place the statement was made the past week that considerable iron has been sold for future delivery and that the demand is still active. No change is reported in steel, finished iron and steel, cast-iron pipe and in other interests. One furnace (at Bessemer) was blown in during the past week. Two more furnaces will go into operation in this district between now and Sept. 15.

**Cleveland.** Sept. 4.

**Iron Ore**—While figures for August have not been compiled, estimates are that ore shipments were less than in July, and probably did not exceed 3,650,000 tons. Movement during the fall is likely to show a recession, since boats will be in demand in other trades, and production will be hindered by cold weather. Shipments this year are likely to fall short of those a year ago, and consequently furnaces fear a shortage during the winter. This has increased their desire to buy for 1907 delivery, but shippers are not yet willing to sell.

**Pig Iron**—Buying for spot shipment in foundry iron is light, not because the consumers are slow to take the material, but because the furnaces cannot supply the demand. In fact the anxiety of foundries to get material for 1906 delivery has caused another advance in price, and No.

2 is now quoted at \$21 at the furnace. Buying for the first half of next year has been so keen that the price is higher, and furnaces are selling at \$19@19.25 in the Valleys. Bessemer and basic are scarce, and prices are moving up. Furnaces are selling at \$18.50@18.75 in the Valley for spot shipment, and also for first-half delivery. Southern interests are selling No. 2 foundry, for delivery in this territory during the first half of the year, at \$15 Birmingham.

**Finished Material**—Owing to the big demand for plates and shapes from railroads and ship-yards, the general consumers are running short of material for immediate use, and are buying either of the jobbers or the small Eastern mills for immediate delivery, paying a premium. Bar iron is scarce, and is selling at 1.60c. Pittsburg. Sheets are scarce and, while prices are steady, an advance is expected.

**New York.** Sept. 5.

**Pig Iron**—The market is strong and prices are if anything a little higher, though the rush of buying is over for the time. There is, practically, no third-quarter iron to be had, and not much for fourth-quarter delivery. A few Southern furnaces still have some to sell, but Northern iron is about out of the market.

Current quotations for pig iron are for New York or parallel delivery:

<b>Northern:</b>	
No. 1 X foundry.....	\$20.25@20.75
No. 2 X foundry.....	19.10@20
No. 2 plain.....	19@19.50
Forge pig.....	17@17.75
<b>Southern:</b>	
No. 1 foundry.....	19.75@20.50
No. 2 foundry.....	19@19.75
No. 3 foundry.....	18.50@19
No. 4 foundry.....	18@18.50
No. 1 soft.....	19.75@20.50
No. 2 soft.....	19@19.75
Gray iron.....	16.75@17.50
<b>Basic pig:</b>	
Northern.....	18.50@19
Virginia.....	18.60@19.10
Alabama.....	

City or local deliveries are not included in prices, which are for large lots, on dock or cars.

**Bars**—Trade has been active and prices are firm. Business has been done at 1.695 @1.745c., tidewater, for iron bars. Steel bars are 1.645c., tidewater; 1.695c. is asked by most mills. Store trade is good at 2¼c. delivered.

**Plates**—Business has been moderate locally; material is scarce. Tank-plates are 1.745@1.845c., according to width; flange and boiler, 1.845@1.945c.; fire-box, 2.25c.

**Structural Material**—A few contracts for buildings are noted, and bridgework is pressing. Prices continue nominally for beams, 1.845@1.895, according to size; angles and channels, 1.845c. for large lots, tidewater. Jobbers ask 2.40@2.50c. for material out of stock.

**Steel Rails**—Prices unchanged for heavy sections, \$28 at mill. Trolley rails are still being called for.

**Philadelphia.** Sept. 5.

**Pig Iron**—The past six days have not developed any surprising changes in the market. There is, if anything, more anxiety upon the part of large consumers of pig iron to protect their forward requirements. All kinds are held at the recent sharp advances. Large transactions have been closed in basic, two or three important ones in bessemer, and a number of large transactions in forge and foundry. There were inquiries for No. 2, which as yet have not been placed, and the blast furnaces will hold to their present quotations. Considerable business has been done at a slight advance over last week's quotations for what is regarded as early delivery.

**Steel Billets**—Steel-billet orders have been crowded in and accepted at the outside quotations heretofore given, and orders for forging billets offer at an advance of about 50c. per ton.

**Bar Iron**—Bar iron in retail has advanced and there is a very active demand from stores; mill owners report a sharp influx of inquiries calling, in some instances, for December delivery.

**Pipes and Tubes**—The consumption of tubes is even heavier than a month ago and the mills are reported as crowded with work, with discounts remaining about the same.

**Sheet Iron**—The sheet mills have a large amount of business in sight. The mills are making deliveries to stores throughout the territory where stocks have been depleted. The stove foundries are in the market this week, and will probably make extensive contracts covering their requirements for the winter.

**Plate**—The steel-plate situation is very strong and some difficulty has been experienced in making deliveries, although the terms of contracts generally are promptly met. A good deal of boiler plate is selling, and the smaller boiler shops throughout the State are all crowded with work.

**Structural Material**—New orders for the past week with one or two exceptions have been for small lots; some important local requirements are being placed this week for bridges in and about the city.

**Steel Rails**—Rail mills are overcrowded, and the requirements for trolley lines will soon assume large proportions. The makers of light rails are now negotiating for considerable supplies of light rails, several lots being wanted for coal-mining developments in West Virginia.

**Scrap**—The scrap market is in a more unsettled condition. All quotations are slightly higher.

**Pittsburg.** Sept. 4.

The iron and steel markets are quiet this week as to new business, but specifications

on old contracts in every line are heavier than usual. Orders booked so far this year for both pig-iron and finished-steel products are in excess of normal production, the business received in July and August, the usually dull midsummer months, being unprecedented in the history of the iron and steel trade. The weather interfered to a great extent with production, and mills are away behind in deliveries. Despite these conditions the leading interests are vigorously opposing any advance in prices, fearing a runaway market. There is no doubt that, with the increase in the price of sheet bars, and the great scarcity of steel, there should be an advance in both sheets and tin plates, but the principal interest continues to quote the old prices, although it is impossible to guarantee prompt deliveries. A denial has been made of a report that the recent advance in prices of sheet bars to \$30 a ton applies to undelivered orders. All orders on the books must be completed at the former price. As consumers of bars have ordered steel for the quarter there have been no sales of any consequence at the advanced rate. The advance in iron bars ordered by the Republic Iron and Steel Company a few weeks ago has been followed by other producers and 1.60c. is now the market. The Cambria Steel Company recently advanced the price of steel bars \$2 a ton to 1.60c., but the other interests refused to quote the higher price as such action might disturb conditions. It is understood a meeting of steel-bar interests is being arranged to consider the question of prices and it may be held here this week. The plate mills were crowded with specifications during the past week, and all are badly congested. The steel-car concerns are operating their plants to capacity in order to complete urgent orders for cars from the railroad companies, as the freight congestion this fall is expected to be the greatest ever known. Mills are not taking on any new business in structural material, as all are swamped with orders and a number cannot complete the business on the books this year.

**Pig Iron**—The report that a large tonnage of unsold bessemer pig iron is to be put on the market, and that prices are likely to drop, is not credited by leading interests. It is positively declared that \$18.75, Valley furnaces, will be the minimum price for the rest of this year. The W. P. Snyder interest has been the only seller of 1906 iron during the past week or two, and it is out of the market for September and has but little to offer for fourth quarter. Basic iron also is scarce and while it is believed that \$18, Valley, will be the price for first half, the leading producer is quoting \$18.50 this week for first quarter and it is declared that this will be the bottom price. It is reported that the Republic Iron and Steel Company bought 10,000 tons of bessemer iron at \$17.75, Valley, but it was on a conversion deal and the

price does not seem to have affected the market. All grades of pig iron are strong, No. 2 foundry being firm at \$18.50@19.10 and gray forge at \$17.85@18.10, Pittsburg.

**Steel**—The scarcity of billets is more acute, and bessemer billets are strong at \$28@29 and open hearth at \$29@30. Sheet bars for prompt shipment are quoted at \$30. Plates are firm at 1.60c. and merchant steel bars at 1.50c., but an advance of \$2 a ton may be ordered.

**Sheets**—Demand continues heavy and mills are unable to make deliveries on specifications on old contracts. Prices remain unchanged at 2.50c. for black sheets and 3.55c. for galvanized sheets, No. 28 gage.

**Ferro-manganese**—There is no change in quotations, and sales of small lots are still being made at \$85@90 for prompt and October shipment.

**Cartagena, Spain.** Aug. 18.

**Iron and Manganiferous Ores**—Messrs. Barrington & Holt report the market as being very brisk with a tendency to higher prices. Various contracts have been made for delivery over the first half of 1907 at prices considerably in advance of those now prevailing, which are, themselves, very firm. Shipments are slack owing to advancing freight rates, 6s. 6d. per ton being the present rate from Cartagena to Rotterdam.

Quotations for iron ores are: Ordinary 50 per cent. ore, 8s. 10d.@9s. 1d. per ton; special low phosphorus, 9s. 4d.; specular ore, 58 per cent. iron, 12s. 1d.; S. P. Companil, 10s. 9d. For manganiferous ores, prices range from 12s. 3d. for No. 3 ore, 35 per cent. iron and 12 per cent. manganese, up to 14s. 6d. for No. 1 B, 25 iron and 17 manganese. All prices are f.o.b. shipping port.

**Chemicals.****NEW YORK, Sept. 5.**

**Copper Sulphate**—The market remains practically unchanged. The demand is active although a very slight weakening is noticeable. Supply keeps up to the demand as well as could be expected under the present conditions of the copper market. We quote car-load lots at \$5.90 per 100 lb. with smaller parcels at \$6, depending upon terms of sale, quantity, etc.

**Nitrate of Soda**—The market is very strong and the demand continues active. Prices are advancing and dealers do not look for a material decline for some time to come. We quote 96 per cent. for 1906 at \$2.55, with the 95 per cent. 5c. less. For 1907 delivery the price is \$2.50 for 96 per cent. and \$2.42½ for 95 per cent.

Silver has advanced sharply in London to 31¼d., due to short supplies and buying by the Indian bazaars. The market closes very firm.

**Phosphates**—Exports of phosphate from



the United States in July were 70,420 tons in 1905 and 85,303 tons in 1906, an increase of 14,883 tons for 1906. The chief exports in July of this year were 23,966 tons to Germany and Holland, 17,677 tons to Great Britain, 16,845 tons to France and 13,393 tons to Italy.

**Sulphur**—Imports of brimstone and of pyrites into the United States, in July, were as follows, in long tons:

	1905.	1906.	Changes.
Sulphur.....	11,068	9,142	D. 1,926
Pyrites.....	54,212	50,066	D. 4,146

The sulphur equivalent of all imports in July this year was about 32,500 tons.

**Heavy Chemicals**—Imports of heavy chemicals into the United States in July were, in pounds:

	1905.	1906.	Changes.
Bleaching powder	7,350,343	7,990,212	I. 639,869
Potash salts.....	20,473,317	33,201,091	I. 12,727,774
Soda salts.....	2,223,583	1,733,655	D. 489,928

Exports of acetate of lime in July were 5,684,107 lb. in 1905 and 5,418,630 lb. in 1906, a decrease of 265,479 lb. this year.

**Metal Market.**

New York, Sept. 3.

**Gold and Silver Exports and Imports.**

At all United States Ports in July and year.

Metal.	Exports.	Imports.	Excess.
<b>Gold:</b>			
July 1906..	\$1,363,248	\$9,838,296	Imp. \$8,535,048
" 1905 ..	1,159,274	4,973,241	" 3,813,967
Year 1906..	32,913,962	72,376,074	" 39,462,112
" 1905 ..	40,990,864	21,582,694	Exp. 19,408,170
<b>Silver:</b>			
July 1906..	4,360,628	3,270,927	" 1,089,701
" 1905 ..	4,285,000	2,976,296	" 1,308,704
Year 1906..	37,797,855	26,947,855	" 10,840,100
" 1905 ..	29,366,266	18,149,719	" 11,216,547

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

**Gold and Silver Movement, New York.**

For week ending Sept. 1 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week....	\$ 3,070	\$ 454,401	\$ 773,214	\$ 58,495
1906.....	5,949,673	49,226,884	39,629,697	1,452,141
1905.....	38,247,843	1,226,547	22,701,219	2,470,283
1904.....	71,907,714	3,705,896	26,915,457	635,963

Exports of gold for the week this year all went to Colon, and of silver, mainly to London. Of the imports of gold, the larger part came from Cuba, and of silver, all from Mexico and Central America.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Sept. 1, gives the following totals, comparisons being made with the corresponding week of 1906:

	1905.	1906.
Loans and discounts..	\$1,136,920,800	\$1,063,739,600
Deposits.....	1,166,587,700	1,042,057,200
Circulation.....	53,095,500	46,038,700
Specie.....	213,787,200	181,745,600
Legal tenders.....	83,358,600	81,638,100
Total reserve.....	\$297,145,800	\$263,383,700
Legal requirements....	291,646,925	260,514,300
Surplus reserve.....	\$5,498,875	\$2,869,400

Shipments of silver from London to the East are reported by Messrs. Pixley &

Abell as follows for the year to Aug. 23:

	1905.	1906.	Changes.
India.....	£ 4,193,371	£ 11,488,443	I. £ 7,295,072
China.....	753,841	280,700	D. 473,141
Straits.....	2,800	1,750	D. 1,050
Total.....	£ 4,950,012	£ 11,770,893	I. £ 6,820,881

Receipts for the week ending Aug. 23 this year were £90,000 from New York, £1000 from Brazil and £1000 from Australia; total £92,000. Exports were £1500 to Egypt, £392,500 to India, and £37,000, in Mexican dollars, to China, or £431,000 in all.

Indian exchange is firm. Council bills offered in London were taken at 16 1/16d. per rupee. Exports of silver to India continue heavy.

**Prices of Foreign Coins.**

	Bid.	Asked.
Mexican dollars.....	\$0.51 3/4	\$0.54
Peruvian soles and Chilean.....	0.47 1/4	0.50
Victoria sovereigns.....	4.85 1/2	4.87 1/2
Twenty francs.....	3.86	3.89
Spanish 25 pesetas.....	4.78	4.80

**SILVER AND STERLING EXCHANGE.**

Aug.-Sept.	Silver.			Sept.	Silver.		
	Sterling Exchange.	New York, Cents.	London, Pence.		Sterling Exchange.	New York, Cents.	London, Pence.
30	4.83 1/4	66 3/4	30 3/4	3	....	....	31 1/4
31	4.83 1/4	66 3/4	30 3/4	4	4.83 1/4	67 1/4	31 1/4
1	4.83 1/4	66 3/4	30 1/4	5	4.82 1/2	67 3/4	31 1/4

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

**Other Metals.**

**Daily Prices of Metals in New York.**

Aug.-Sept.	Copper.			Tin.	Lead.	Speiter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.			New York, Cts. per lb.	St. Louis, Cts. per lb.
30	18 3/4	@18 3/4	85 3/8	40 1/2	5.75	6.05	5.90
31	18 3/4	@18 3/4	85 3/4	40 3/4	5.75	6.05	5.90
1	@19	@18 3/4	....	40 3/4	5.75	6.05	5.90
3	....	....	85 3/4	....	....	....	....
4	@19	@18 3/4	85 1/2	40 3/4	5.75	6.05	5.90
5	@19	@18 3/4	86 3/4	40 3/4	5.75	6.05	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. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations in speiter are for ordinary western brands; special brands command a premium.

**Copper**—Business during the past week was of very large volume. It would seem that consumers all over the world have

come to a realization of the excellent statistical position of the metal and have arrived at the conclusion that nothing will be gained by deferring purchases. Acting upon this conclusion, their purchases have carried the market upward and prices close firm at 18 3/4@19c. for Lake copper and 18 9/16@18 3/4 for electrolytic in ingots, cakes and wirebars. The average price for casting copper, ordinary brands, for the week has been 18 1/4@18 3/4c.

The standard market in London has steadily advanced and closes very firm at £86 7s. 6d. for spot and £86 7s. 6d. for three months. Statistics for the second half of August show a decrease in the visible supplies of 400 tons.

Refined and manufactured sorts we quote as follows: English tough, £89@£90; best selected, £90@£91; strong sheets, £96@£97.

At the close the market for all grades of copper is very strong. Large sales have been made right up to the end of the year, and some sales for delivery in 1907. A feature of the market is the interest of foreign consumers in covering their requirements for a longer period ahead than ordinarily, sales having been made for export in November and December.

**Copper Exports and Imports**—The exports of copper from the United States for the seven months ending July 31 are reported as below by the Bureau of Statistics of the Department of Commerce and Labor, in long tons:

To:	1905.	1906.	Changes.
Great Britain.....	17,207	13,809	D. 3,398
Belgium.....	1,134	1,390	I. 256
France.....	18,890	20,411	I. 1,521
Italy.....	4,000	4,460	I. 460
Germany and Holland	60,460	66,475	I. 6,015
Russia.....	5,000	1,550	D. 3,450
Other Europe.....	6,300	7,000	I. 700
Canada.....	826	806	D. 20
China.....	28,456	1,660	D. 26,856
Other countries.....	5,480	133	D. 5,347
Total metal.....	147,693	117,634	D. 30,059
In ore and matte.....	3,280	3,973	I. 693
Total.....	150,973	121,607	D. 29,366

The decrease in the total was about 23 per cent., mostly attributable to China. The actual quantities of ore and matte exported were 19,071 tons in 1905 and 28,602 tons in 1906; contents are computed on the basis of value.

Imports of copper in bullion and in ore and matte for the seven months of 1906 are reported as follows; the figures give the contents of all material in long tons of fine copper:

	Metal.	In ore, etc.	Total.
Mexico.....	22,760	8,411	31,171
Canada.....	9,000	2,540	11,540
Great Britain.....	6,000	....	6,000
Other countries.....	7,440	1,880	9,320
Total imports.....	45,200	12,831	58,031
Re-exports.....	300	42	342
Net imports.....	44,900	12,789	57,689
Net imports, 1905.....	38,495	11,899	50,394

The total increase this year was 7295 tons, or 17 per cent. The actual tonnage of ores and matte from Mexico this year

was 64,548; from Canada and Newfoundland, 24,783 long tons.

**Tin**—No business of importance has been reported. However, the market has been showing a very steady undertone and an upward tendency has developed at the close. Prices are firm at 40½@40¾.

The London market fluctuated within narrow limits during the early part of the week, but at the close there was a sudden advance to £185 for spot and £184 7s. 6d. for three months. Statistics for the month of August show a decrease in the visible supplies of 1200 tons.

Exports exceeded net imports by 100,579 tons in 1905 and by 63,918 tons in 1906, a decrease of 36,661 tons this year.

Imports of tin into the United States for the seven months ending July 31 are reported as below, in long tons of 2240 lb. each:

	1905.	1906.	Changes.
Straits.....	12,731	8,871	D. 3,860
Australia.....	808	606	I. 298
Great Britain.....	11,086	15,498	I. 4,412
Holland.....	264	292	I. 28
Other Europe.....	458	963	I. 505
Other countries.....	33	36	I. 3
<b>Total.....</b>	<b>24,880</b>	<b>26,266</b>	<b>I. 1,386</b>

The increase in the total imports this year was only 5.6 per cent.

**Lead**—A good consumption is noted in all manufacturing lines and business continues at a satisfactory rate. Quotations have not been changed.

The advices from London indicate an exceptionally strong market. A demand of heavy proportions has developed, and in view of the low stocks prices have been affected materially, the closing being £17 17s. 6d. for Spanish lead and £17 18. 9d. for English lead.

Imports of lead into the United States for the seven months ending July 31, with re-exports of foreign metal, are reported as follows, in short tons, of 2000 lb. each:

	1905.	1906.	Changes.
Lead, metallic.....	3,020	8,370	I. 5,350
Lead in ores and base bullion.....	56,738	47,266	D. 9,472
<b>Total imports.....</b>	<b>59,758</b>	<b>55,636</b>	<b>D. 4,122</b>
<b>Re-exports.....</b>	<b>38,366</b>	<b>29,074</b>	<b>D. 9,292</b>
<b>Net imports.....</b>	<b>21,392</b>	<b>26,562</b>	<b>I. 5,170</b>

Of the lead imported this year 49,789 tons were from Mexico and 4443 tons from Canada. There were 6211 tons imported from Europe. The exports of domestic lead were 186 tons in 1905, and 219 tons in 1906; an increase of 33 tons this year.

**St. Louis Lead Market**—The John Wahl Commission Company wires from St. Louis, Sept. 4, that Missouri brands of lead are strong in that market at 5.75@5.77½ cents.

**Spanish Lead Market**—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Aug. 18, that pig lead has risen from 76.75 to 79 reales per quintal

(£15 15s. 9d. per long ton), f.o.b. Cartagena. Silver is paid for at 13.15 reales per ounce. Exports during the week were 165 tons desilverized to Marseilles, and 128 tons argentiferous to London.

**Spelter**—This metal has been rather inactive and business is more or less of a retail character. Prices are steady at 5.90c. St. Louis, and 6.05c. New York.

The London spelter market, in sympathy with other metals, is showing a further improvement and closes at £27 10s. for good ordinaries, and £27 15s. for specials.

Exports of spelter from the United States for the seven months ending July 31 were 1904 short tons in 1905, and 2962 tons in 1906; an increase of 1058 tons. Exports of zinc ore were 16,133 tons in 1905, and 18,364 tons in 1906; an increase of 2231 tons. Exports of zinc dross were 8167 tons in 1906. This was not separately reported last year.

**Zinc Sheets**—The price of zinc sheets is \$7.75 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 600-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since Jan. 1, 1906, have been small, the highest price having been \$8 on Jan. 6, the lowest \$7.65 on May 18.

**Antimony**—After some weeks of dullness there are signs of a revival of trade, although there has been comparatively little buying as yet. Business is reported to have been done at 20½@22½c. for ordinary brands, and 24@25c. for specials.

Imports of antimony into the United States for the seven months ending July 31 were, in pounds:

	1905.	1906.	Changes.
Metal and regulus.....	2,795,819	4,351,214	I. 1,555,395
Antimony ore.....	1,100,457	974,948	D. 125,509

This shows an increase of 56.4 per cent. in metal and regulus, but a decrease of 11.4 per cent. in ore.

**Nickel**—Quotations for large lots, New York or other parallel delivery, as made by the chief producer, are 45@50c. per lb. for large orders, according to size of order and terms. For small lots, 50@65c. is charged.

Imports of nickel ore and matte into the United States for the seven months ending July 31 were 7965 tons in 1905, and 8525 tons in 1906; an increase of 560 tons. Exports of nickel, nickel oxide and nickel matte for the seven months were 6,191,378 lb. in 1905, and 6,931,506 lb. in 1906; an increase of 740,128 lb. this year.

**Platinum**—Another sharp advance has occurred in the price of platinum. Owing to the scarcity of the metal and the unsettled state of affairs in Russia, which necessarily limits production, prices have advanced until now \$33 per oz. is being

asked for platinum in unmanufactured form and \$24 is offered for scrap metal. It is impossible to predict future prices, but dealers look for little or no recession from present quotations for some time to come.

Imports of platinum into the United States for the seven months ending July 31 were 4371 lb. in 1905, and 6594 lb. in 1906; an increase of 2223 lb. this year.

**Quicksilver**—The metal is firm and New York prices are still \$41 per flask of 75 lb. for lots of 100 flasks or over, and \$42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to about \$43 per flask. San Francisco prices are firm at \$39.50 for domestic orders and \$38 for export. The London price is lowest at £7 per flask, while jobbers are asking £16 18s. 9d.

Exports of quicksilver from the United States for the seven months ending July 31 were 646,829 lb. in 1905, and 353,559 lb. in 1906; a decrease of 293,270 lb. this year.

**Aluminum**—The chief producer gives list prices for ton lots and over, as follows: No. 1, over 99 per cent. pure, 36c. per lb.; No. 2, over 90 per cent., 34c. Small lots are from 1 to 3c. higher. Granulated metal is 2c. per lb. over price of ingots; rods, 1c. per lb. over ingots. Rolled sheets are 45c. per lb. up, according to size.

Exports of aluminum from the United States for the seven months ending July 31 were valued at \$95,043 in 1905, and \$137,353 in 1906; an increase of \$42,310 this year.

**Wisconsin Ore Market.**

PLATTEVILLE, Sept. 1.

The readiness with which zinc-ore buyers are taking up all grades of ore as fast as cleaned, shows that roasting practice has increased the demand for the lower grades as well as raised the price of separated ore until it pays to treat the ore magnetically.

The production has shown a decided increase during the latter part of the month, notwithstanding that several of the larger producers have been shut down.

The camps of the Platteville zinc and lead district loaded ore as follows, during the week ending Sept. 1:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville.....	406,855	.....	.....
Highland.....	505,960	.....	.....
Cuba City.....	353,000	.....	.....
Linden.....	226,400	.....	.....
Benton.....	277,400	.....	.....
Buncombe & Hazel Green	79,200	.....	.....
Galena.....	68,400	.....	.....
Harker.....	65,410	.....	.....
Linden.....	50,000	.....	.....
Mineral Point.....	30,500	.....	.....
<b>Total for week.....</b>	<b>2,063,185</b>	.....	.....
<b>Year to Sept. 1.....</b>	<b>47,965,376</b>	<b>2,382,550</b>	<b>2,733,470</b>

The buyers generally are exercising



good judgment in keeping the price on a fair basis. Higher prices will no doubt prevail the coming fall and winter. At the present writing there is an upward tendency, as the price of 60 per cent. ore ranges from \$44 to \$44.50, governed as usual by a few local conditions. At the same time increased production will no doubt control the extreme prices to a certain extent.

One of the principal developments of the week has been the starting of the Hazel Green roaster.

The jump in the price of zinc ore is ascribed by the local buyers to the advent of the Mineral Point Zinc Company's buyer, reported in the JOURNAL last week. The buyer who has been getting practically all the Empire ore lost two carloads to the Mineral Point Zinc Company. It is thought it will be shipped to De Pue.

**Missouri Ore Market.**

JOPLIN, Sept. 1.

The highest price reported paid for zinc ore was \$48 per ton for a few bins, small in tonnage. A quantity sold at \$47.50, but the assay basis ranged from \$45 down to \$42 per ton of 60 per cent. zinc, averaging \$43.78.

The highest price paid for lead was \$82.50 per ton for at least one large bin of ore, prices ranging down to \$79 per ton for medium grades. The average price was \$79.62.

While prices in midweek, and also the outward appearance at the end of the week, were toward a lower level, it is known that one buyer raised his own bid \$2 per ton on Saturday for the following week's delivery, indicating a strong undercurrent to the situation.

None of the smelting companies seems to know when the end to lead advances will come, the upward trend being due to a shortage of soft lead in the world's output.

The conditions for production in the Joplin district are now at their best, good weather and new mills adding to the sum total each week.

Following are the shipments of zinc and lead for the week ending today:

	Zinc, lb.	Lead, lb.	Val
Joplin.....	3,270,900	883,170	\$ 88,921
Webb City-Carterville..	2,170,820	400,900	64,879
Galena-Empire.....	1,281,310	153,340	33,682
Alba.....	907,880	6,940	21,888
Duenweg.....	384,110	161,000	15,082
Badger.....	551,100	.....	12,950
Oronogo.....	488,120	47,700	12,549
Aurora.....	408,750	48,940	9,076
Prosperity.....	122,710	146,680	8,627
Neck City.....	324,630	.....	7,628
Spurgeon.....	346,230	44,210	7,514
Baxter.....	233,290	.....	3,817
Sherwood.....	106,050	28,950	3,621
Carthage.....	136,020	.....	3,196
Wentworth.....	55,540	.....	1,221
Harrison, Ark.....	50,000	.....	750
Totals.....	10,837,460	1,421,230	\$194,901

35 weeks.....369,478,500 51 499,070 \$9,986,729  
 Zinc value, the week, \$238,318; 35 weeks, \$8,024,568.  
 Lead value, the week, 56,583; 35 weeks, 1,962,171.

The following table shows the average monthly prices of zinc and lead ores in

Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc.

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January...	52.00	47.38	January....	61.50	75.20
February...	52.77	47.37	February...	67.62	72.83
March.....	47.40	42.68	March.....	67.20	73.73
April.....	42.88	44.63	April.....	68.00	75.13
May.....	43.31	40.51	May.....	68.27	78.40
June.....	40.75	43.83	June.....	67.80	80.96
July.....	43.00	43.25	July.....	68.00	74.31
August.....	48.83	.....	August.....	68.00	.....
September..	46.75	.....	September..	63.50	.....
October....	47.60	.....	October....	63.86	.....
November..	49.55	.....	November..	68.67	.....
December..	49.00	.....	December..	76.25	.....

**Mining Stocks.**

NEW YORK, Sept. 5.

The general market has had a much firmer tone, with prices generally higher. Toward the last of the week money became exceedingly tight with abnormal rates prevailing. Today the rate had reached 40 per cent. with the prospect of a still further advance. Amalgamated copper proved very active and closed strong at \$111½. Nearly 475,000 shares were dealt in and the closing price was \$3½ in advance of last week's closing. Anaconda was not so largely dealt in, yet closed at \$280¾, \$4¾ higher than a week ago.

American Smelting common sold off \$1 a share, closing at \$154¼ on sales of 148,000.

The large dealings in Steel common which characterized last week's market were not in evidence this week. The stock closed at \$46¾, \$7¾ higher. The preferred was steady on small dealings, closing at \$116½.

On the Consolidated Exchange, Mary McKinney closed at 63@64c., an advance of 8c. Jim Butler sold \$1.42@1.46, a loss of 8@11c. for the week. Comstock shares were little dealt in.

In the curb market, Nipissing was by far the leader, and showed great strength in spite of profit taking. On reports of rich finds at the mine the stock advanced sharply to \$9½, in substantial daily gains, when the price was beaten down to \$9¾. During the week 56,800 shares were dealt in.

Cumberland-Ely was again strong among the copper stocks, closing at \$9¾ on 20,000 shares for the week. The net advance was \$½. British Columbia copper closed at \$10½ on sales of 20,000 shares.

Greene Gold and Silver was a marked feature, the selling being very heavy early in the week. The price was forced down to \$1½, at which point the stock recovered, closing at \$2. The dealings amounted to 47,000 shares for the week.

The closing prices of other mining stocks were: Butte Coalition, \$33; Micmac, \$5½; Mitchell, \$5¼, a drop from \$8 the previous week; Nevada-Utah M. & S., \$4¼.

Boston. Sept. 4.

There is little change to note in the mining-share market. Further increased dividend announcements affect the market only momentarily and the fact that sales of copper last month were the heaviest on record is not recognized. Prices held buoyant last week and until today, when they weakened in sympathy with the New York list. Wolverine is up \$4 for the week to \$159. This company has increased its semi-annual payment to \$9. Copper Range the same day increased its quarterly rate to \$1.50 yet it closed a trifle below a week back at \$77.75. Franklin spurted to \$21.12½ last week on heavy trading and closed \$1.25 better than a week ago at \$19.75. Lake buying of Greene Consolidated caused the price to stiffen to \$25.50, but the stock settled to \$25 again. Tecumseh rose to \$13, in sympathy with Franklin's rise, but fell back to \$11.25 tonight.

Amalgamated touched \$111.25 in the hurrah over the holiday season, and closes this week with a net gain of \$1.25 at \$109.50. Butte Coalition touched \$33.50, and closes a trifle higher for the week at \$32.87½. Calumet & Arizona settled to \$116.50 ex-dividend tonight. Old Dominion responded \$1 to \$41.50 on announcement that last month was its banner one as regards output. Osceola has held at \$114 and better. Allouez declined \$1 to \$34, on knowledge of the falling off in last month's rock contents. North Butte has been in the fore with a variation from \$93.25 to \$94.75. Announcement is made that Calumet & Hecla is clinching its hold on the Superior property. Cumberland, Ely and Nipissing have been the curb features. The former rose from below \$9 to \$10.12½ and the latter from \$6.75 to \$9.62½. Davis Daly is just under \$10.

Colorado Springs. Aug. 31.

Cripple Creek stocks have been in very good demand during the past week, and in some cases prices have made good advances, Mary McKinney being the most active, advancing from 54 to 68 during the seven days just passed. Portland recovered from its sharp decline of last week, and opened at 1.42, but declined a few cents at the close.

Mexico Aug. 27.

The mining-share market during the past week continued rather weak but still more strength was shown than for some time past. The sales reported were at the following prices: State of Guanajuato: Providencia San Juan de la Luz, \$1850; and Roma, \$25. In San Luis Potosi: Santa Maria de la Paz, \$260; and Barreno, \$200. In the El Oro district Maria Luisa sold for \$25, Borda Antigua for \$57, Aldebarran for \$86, and Chihuahua for \$1.25. In Hidalgo the following prices were realized: Amistad y Corcordia, \$74.50; and San Rafael, \$98.

STOCK QUOTATIONS.

NEW YORK. Week Sept. 4. Table with columns: Name of Company, High, Low, Clg., Sales. Includes companies like Amalgamated, Anaconda, British Col. Copper, etc.

NEW YORK INDUSTRIALS. Table with columns: Name of Company, High, Low, Clg., Sales. Includes companies like Am. Smelting & Ref., Am. Smelt. & Ref. Pf., Bethlehem Steel, etc.

BOSTON. Table with columns: Name of Company, High, Low, Clg., Sales. Includes companies like Adventure, Allouez, Atlantic, Bingham, etc.

These stocks, not elsewhere quoted, had the following range of prices during the week: (New York) Am. Agri. Chem., 24-23; Gold Hill, 3-2 1/2; Comstock, 14; Gugg. Exp., 290-285; Prec. Metals Co., 5 1/2; Standard Oil, 606-600. (Boston) Ahmeek, 80; Am. Zinc, 10 1/2; Arcadian, 3-2 1/2; Ariz. Com'l., 37 1/2-36 1/2; Black Mt., 8 1/2-8; East Butte, 10 1/2-9 1/2; Keweenaw, 10 1/2-10; Majestic, 1 1/2-1; Raven, .81-.75; Shawmut, 1.00; Superior Cop., 17-15; Superior & Pitts., 17; Troy, 1 1/2-1 1/4.

\* Ex. div.

PHILADELPHIA. Sept. 4. Table with columns: Name of Company, High, Low, Clg., Sales. Includes American Cement, Cambria Steel, General Asphalt, etc.

PITTSBURG. Sept. 4. Table with columns: Name of Company, High, Low, Clg., Sales. Includes Crucible Steel, Crucible Steel, Pf., Harbison-Walker Ref., etc.

COLORADO SPRINGS. Sept. 1.

Table with columns: Name of Company, High, Low, Clg., Sales. Includes Acacia, C. C. Con., Doctor Jack Pot., etc.

SAN FRANCISCO. Aug. 29.

Table with columns: Name of Company, High, Low, Clg., Sales. Includes Best & Belcher, Caledonia, Chollar, etc.

Tonopah Stocks. Sept. 5.

(Revised by Weir Bros. & Co., New York.)

Table with columns: Name of Company, High, Low, Last. Includes Tonopah Mine of Nevada, Tonopah Montana, etc.

St. Louis. Sept. 1.

Adams, \$0.40-\$0.25; American Nettle, \$0.10-\$0.08; Center Creek, \$2.50-\$2.10; Central Coal and Coke, \$64.00-\$63.00; Central Coal and Coke, pf., \$80.00-\$79.00; Central Oil, \$60.00-\$58.00; Columbia, \$4.00-\$3.90; Con. Coal, \$24.00-\$22.50; Doe Run (old stock), \$350.00-\$300.00; Granite Bitumetic, \$0.25-\$0.20; St. Joe (old stock), \$32.00-\$30.00.

LONDON. (By Cable.) Sept. 5.

Dolores, £1 12s. 6d.; Stratton's Independence, £0 4s. 3d.; Camp Bird, £1 7s. 0d.; Esperanza, £3 1s. 3d.; Tomboy, £1 5s. 0d.; El Oro, £1 10s. 7 1/2d.; Oroville, £0 18s. 9d.; Somera, £0 7s. 6d.; Utah Apex, £1 5s. 0d.; Ariz. Copper, Pref., £3 12s. 9d.; Ariz. Copper, Def., £3 10s. 6d.

\*Furnished by Hayden, Stone & Co., New York.

New Dividends.

Table with columns: Company, Payable, Rate, Amt. Includes Bingham & New Haven, Butte Coalition, Calumet & Arizona, etc.

Assessments.

Table with columns: Company, Delinq., Sale, Amt. Includes Black Diamond, Utah, Copper Ranch, Utah, Lower Mammoth, Utah, etc.

Monthly Average Prices of Metals.

SILVER. Table with columns: Month, New York (1905, 1906), London (1905, 1906). Includes January, February, March, etc.

The New York prices are in cents per fine ounces; the London quotation is in pence per standard ounce, 0.925 fine.

COPPER. Table with columns: Month, New York (Electrolytic, Lake), London (1905, 1906). Includes January, February, March, etc.

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Table with columns: Month, 1905, 1906, Month, 1905, 1906. Includes January, February, March, etc.

Prices are in cents per pound.

LEAD IN NEW YORK.

Table with columns: Month, 1905, 1906, Month, 1905, 1906. Includes January, February, March, etc.

Prices are in cents per pound. The London average for January, 1906, was £16.860 per long ton; February, £16.031; March, £15.922; April, £15.959; May, £16.725; June, £16.813; July, £16.525; August, £17.109.

SPELTER.

Table with columns: Month, New York (1905, 1906), St. Louis (1905, 1906), London (1905, 1906). Includes January, February, March, etc.

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.