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The Bag-house at Selby, California

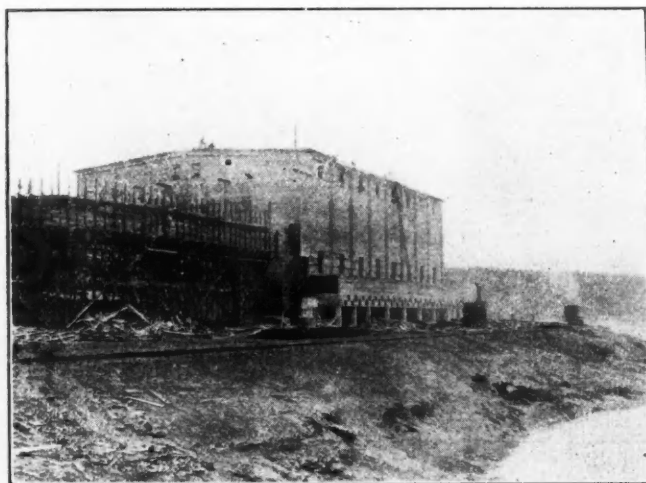
A Detailed Description of the Bag-house for Large Lead Smelting Works. The Use of Reinforced Concrete Proved a Complete Success

BY JAMES C. BENNETT

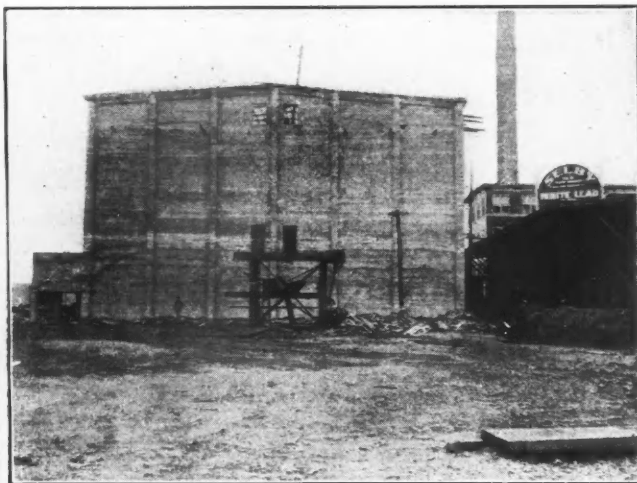
Though the design of the bag house at the Selby plant was partially governed by some conditions that are probably peculiar to this particular location, a presentation of them may be of interest and value to others.

for the surface to reach the stage of final settlement. Further, the composition of the gases to be filtered is unusually severe on structural material, by reason of the uncommonly large amount of contained moisture.

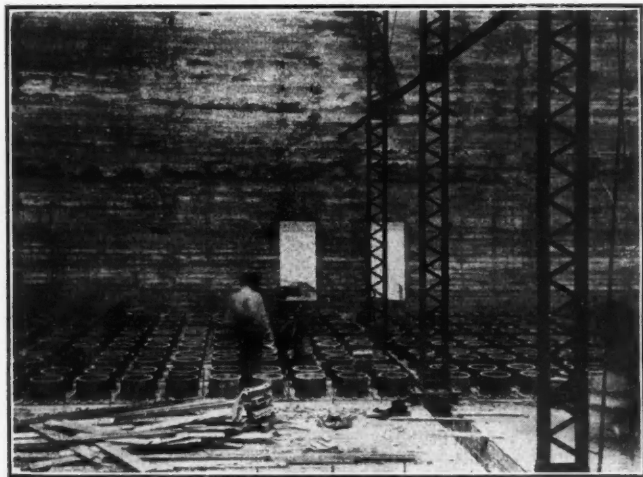
building was decided upon as probably affording the most substantial structure in the event of earthquake, and as further affording greater security against damage from settlement of the filled ground. As the accompanying drawings and photo-



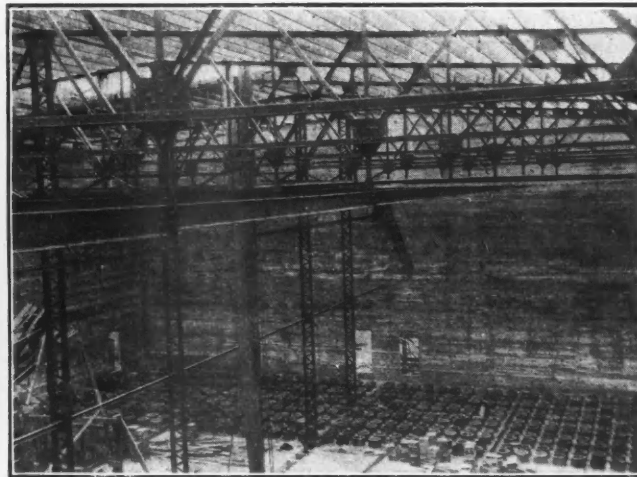
GENERAL VIEW OF BAG HOUSE



SOUTH END OF BAG HOUSE



INTERIOR VIEW, SHOWING BAG FLOOR



INTERIOR VIEW OF BAG CHAMBER

MATERIAL FOR BAG HOUSE

In the first place, brick was not considered a suitable material, owing to the liability of this section to earthquake. Then, too, the available ground was all made by dumping the molten slag into the waters of the bay. Owing to the great depth of the mud, a long time is required

Since the plans for the installation were undertaken some ten months prior to the seismic disturbances of April, 1906, the possibility of earthquake damage was considered too remote to afford the strong argument against brick buildings of this nature that it would now. After much discussion, however, a reinforced concrete

graphs give full information as to the structural features, it is unnecessary to dwell at great length upon this part of the subject.

To guard against damage to the concrete by the acids carried in the gases, the intake flue extending along the side of the building, and the dust chambers of

the main building were lined with unglazed fireclay tiling which was locked into the concrete by the dovetailed ribs on the backs.

AN EARTHQUAKE TEST

That the belief in the strength and durability of reinforced concrete was well founded was very fully demonstrated by the manner in which the building weathered the storm of April 18, 1906. At the close of work on April 17 the walls had attained a height of about 42 ft. above the ground, and were entirely without exterior support. On the inside they were sup-

portance structurally, as it could not possibly be more than a surface crack extending only to the reinforcing bars.

It seems unnecessary to say more than call attention to the probable effect on the structure had it been of brick, as was at first contemplated, for with the green condition in which the work must necessarily have been, there could have been but one result—the practically complete demolition of the entire work, for aside from the isolated chimneys on the plant, there was scarcely a chimney left standing intact. It is a curious incident, however, that throughout the 1500 or 2000 ft. of

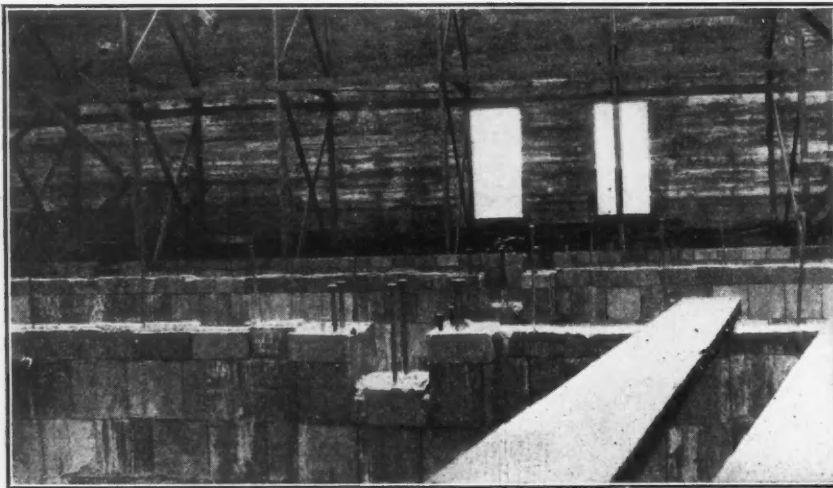
generated by two silver-lead blast furnaces, each 36x144 in. at the tuyere line, and smelting a total of about 360 tons of charge in 24 hours; three cupel furnaces and one sweating furnace. To these were to be added two 60-ton softening furnaces and two 60-ton refining furnaces. To this equipment was to be added provision for a third blast furnace of the same size and rated capacity as the two just described.

To provide a motive column for the filtered and cooled gases issuing from the bag house, the combustion gases from the zinc retorts were carried through an independent flue and delivered directly into the base of the stack. The following observations were made of the gases passing through the main flue:

	Temperature. Deg. F.	Suction Oz.
At base of the stack.....	350	0.430
At 135 feet from base of stack..	184	0.362
At 530 feet from base of stack..	144	0.362

At about 145 ft. from the stack the cupel and sweating furnaces deliver their gases into the main flue, and at 125 ft. the zinc-retort gases enter.

The limiting temperature of the gases entering the bag-house was decided upon as 180 deg. F. This was considered as about the highest that could be maintained at the bags with reasonable security against fire. In view of the high temperature, even after the elimination of the zinc-retort gases, it was decided to use plate steel in the construction of that part



TRANSVERSE WALLS BELOW BAG FLOOR

ported only by the temporary wind bracing, there being still some 8 ft. to the final height. Some three or four hours after the earthquake, I examined carefully the condition of the ground and of the building. The ground was considerably shattered on the shoreward side of the building, though there were no large cracks, and no apparent settling, the ground having been evidently forced upward sufficiently to overcome its resistance to shearing and then restored to its original position. The building showed no evidence whatever of ill effects—the tile lining on the lower part of the walls was absolutely intact. When examined with the aid of a level, there could be found no indication of any settlement, although a few days later a settlement of about 1 in. was found on one corner. There were no cracks in any part of the building; I was told, however, by one of the workmen that there was a very small horizontal crack running along near the top of one wall of the flue, which is built against the shore side of the building and is a part of the monolithic mass of the main building. On later examination this crack could not be found; but, granting that it did exist, its presence might very reasonably be attributed to the natural settlement and contraction of the concrete, and it may easily have existed before the time of the earthquake. Certainly it was of no im-



LAYING FLOOR OF INLET FLUE

brick flue but one crack was discovered. This excellent result may be attributed probably to the quality of the work, as it was built entirely by day work, and under the supervision of a foreman who takes a remarkable pride in the character of his work.

CAPACITY OF PLANT

In determining the size and capacity of the plant the following data were secured. The gases to be filtered were those

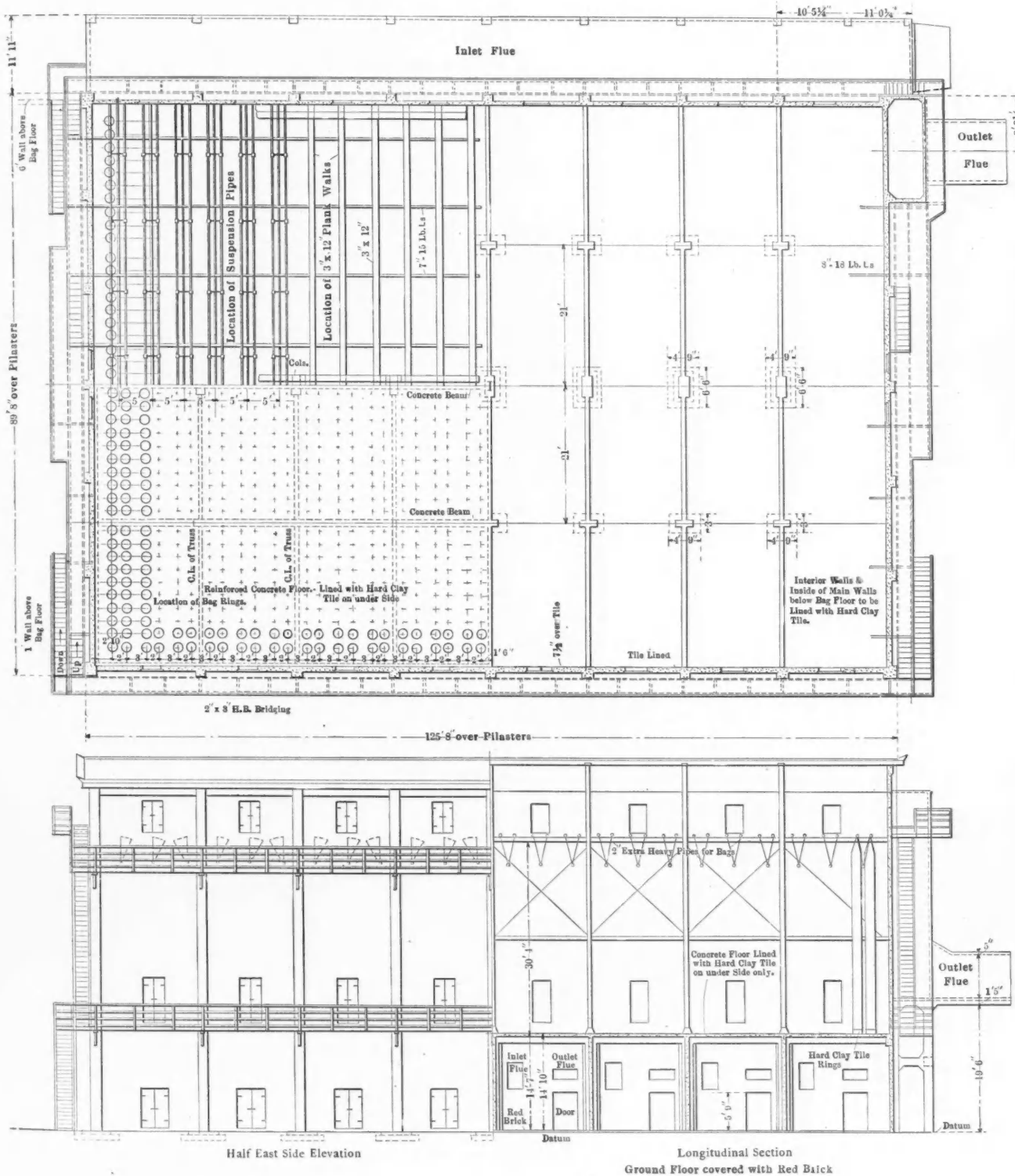
of the flue between the main flue and the fan, thus reducing the temperatures by means of the radiating effect of the steel.

From the amount of suction and the dimensions of the main flue it was found that there were 45,234 cu.ft. of gas per minute passing through the flue. To this was added 50 per cent. as provision for the possible third blast furnace and the softening and refining furnaces, which were not then in commission, thus making a total ultimate volume of 67,851 cu.ft.

per minute to be handled, with a starting volume of 55,000. The volume of gases passing through the flue at the time of measurement was determined by the formula

coefficient of friction, and $s =$ rubbing surface in sq.ft. Further computation showed that the velocity of the gases was 538.5 ft. per min., or 8.975 per second. It may be thought that the provision for

house has been in commission, some more reliable data have been secured, though it is still not certainly known how correct it is. This will be referred to a little later.



PLAN, ELEVATION AND SECTION OF BAG HOUSE

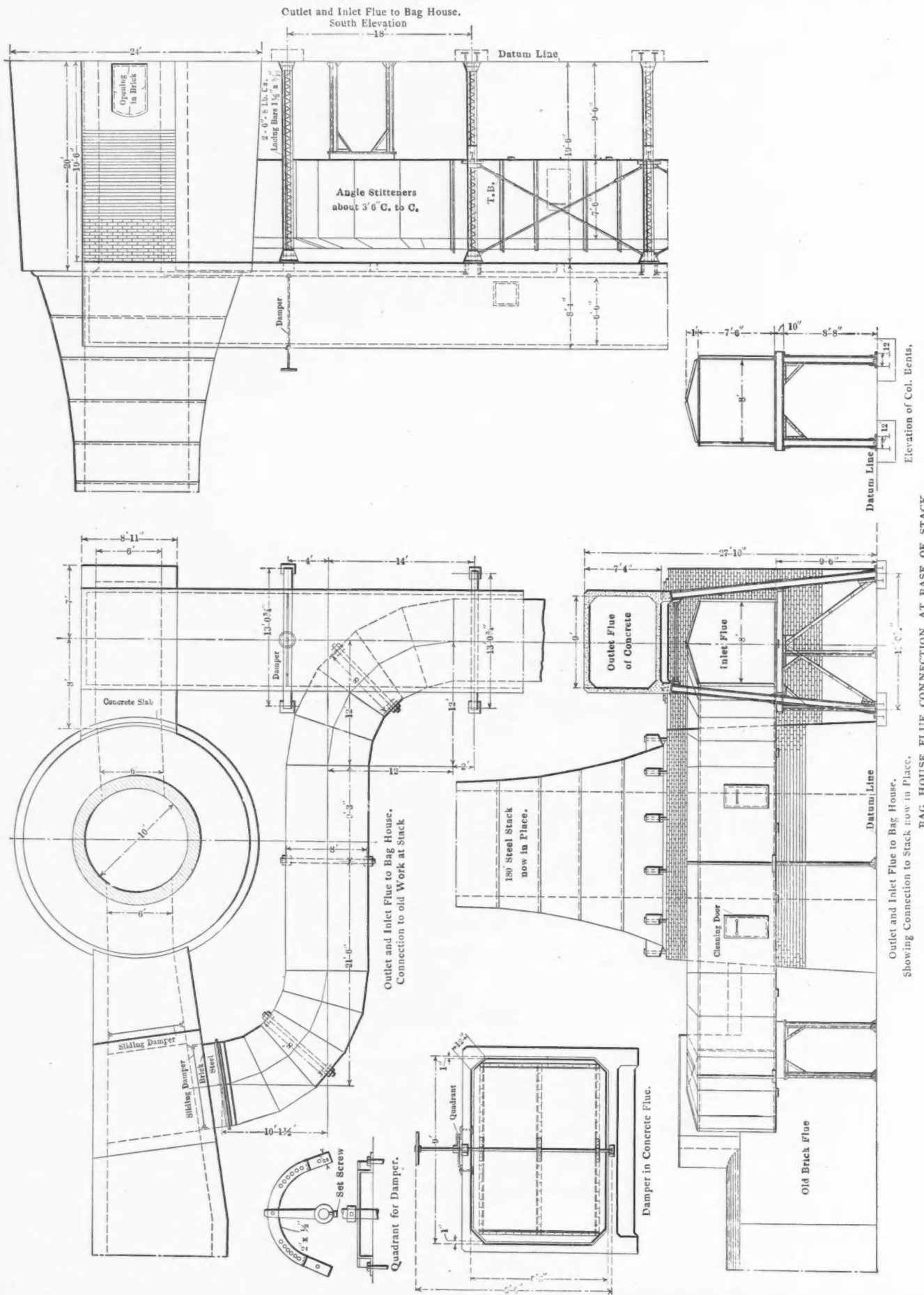
$$Q = \sqrt{\frac{p a}{k s}}$$

in which $Q =$ volume, $p =$ pressure in pounds per sq.ft., $a =$ area in sq.ft., $k =$

additional duty was somewhat arbitrary in its determination, and this is true. Having no special instruments for measuring the flow, there was at the time no other means available. Since the bag-

THE FAN AND MOTIVE POWER

A larger fan was installed than was actually required to handle even the ultimate volume as estimated. When it is remembered that the consumption of power

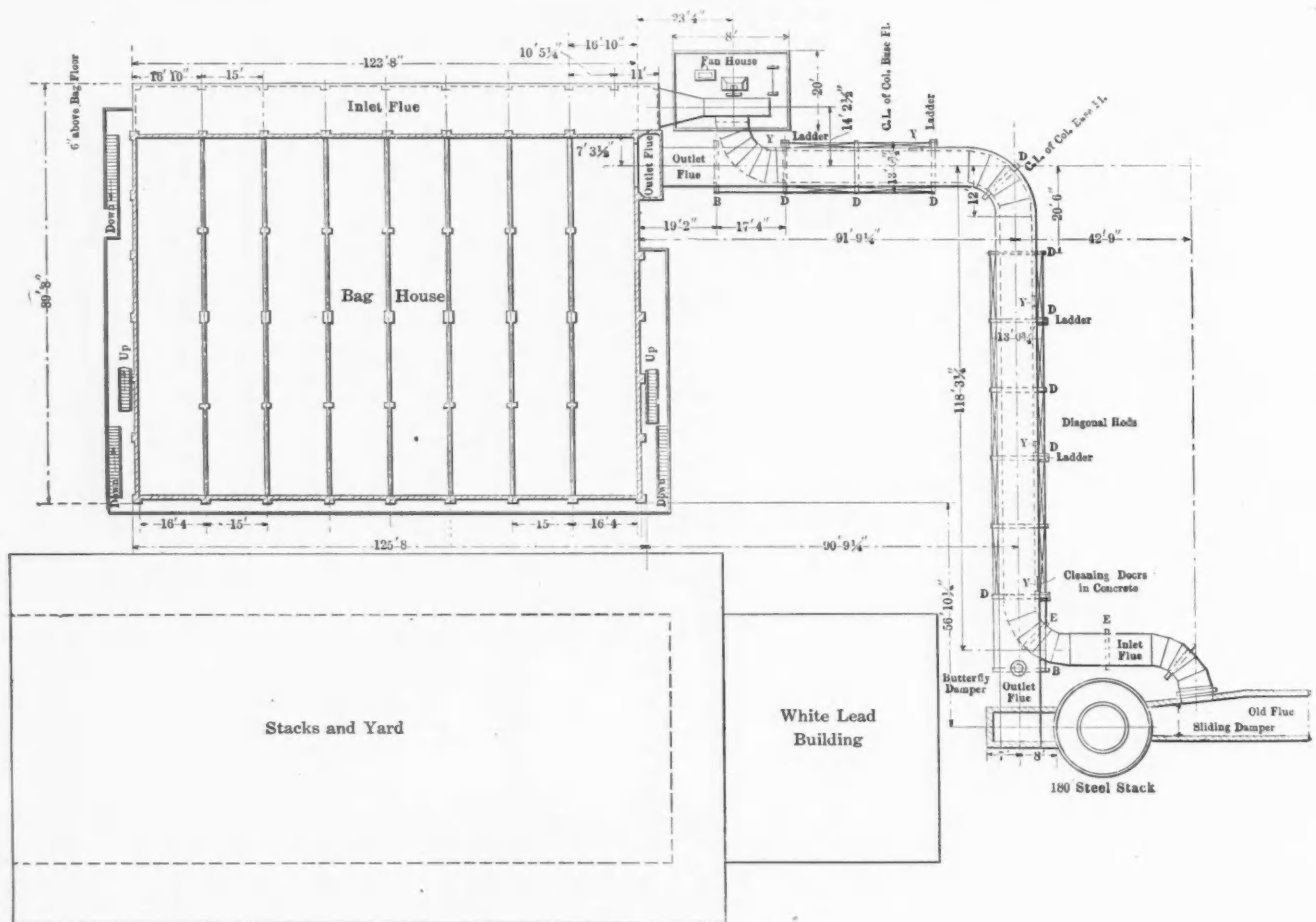


varies directly as the cube of the speed at which the wheel is driven, it will be appreciated that the reduction in power would soon offset the additional cost of a larger fan. The fan is known by its manufacturers as a 220-in. machine, and has a wheel 11 ft. in diameter by 5 ft. 6 in. wide. Its rated capacity is 75,200 cu.ft. per minute at 60 deg. F., when running at a speed of 130 r.p.m., the difference in pressure between inlet and outlet being 0.75 oz. For this duty 35 h.p. would be required. From the higher temperature and the decreased volume, it was found that the wheel should be driven at a speed of 77 r.p.m., when it would deliver 55,000

terms of blast-furnace capacity, a filtering area of 480.35 sq.ft. per ton of charge was provided.

It is difficult to find reliable data on which to base calculations for the amount of filtering surface, for there seems to have been little or no publication of such information. The only data which the writer was able to find was an article published some three or four years ago in the *ENGINEERING AND MINING JOURNAL*, but even in that article the extremes were widely apart, and no suggestion was made as to what might be considered good practice. Mention may also be made of the chapter, in Hofman's "Metallurgy of

system, the permissible velocity of the gases is known within fairly narrow limits. Having then the area of the flue, it is but a simple matter to determine the total volume of gas for which provision must be made. As at present treated, the basis for calculation—tonnage—is so flexible that it is of but little value for more than a rough approximation. In two furnaces of the same size and treating the same tonnage, the one may have a fine, tight and highly sulphurous charge, requiring a very large volume of air, while the other may be running on an ore which forms a loose charge low in sulphur, and requires a low blast pressure, with conse-



LOCATION PLAN OF BAG HOUSE

cu.ft. per min. at a temperature of 180 deg. F., against a total difference of pressure of 0.75 oz. with a consumption of 7.28 horse-power.

BAG CAPACITY

There are 1920 bags in the building, each 18 in. diameter and 28 ft. 8 in. effective length, giving a filtering surface of 135.1 sq.ft. per bag, or a total of 259,392 sq.ft. Based on the original plans of three blast furnaces, having a combined capacity of 540 tons, an allowance of 410 sq.ft. of filtering surface per ton was made, to which was added 17 per cent. to care for the other furnaces which have already been enumerated. Reducing the whole to

Lead," on bag-houses for use in the manufacture of white lead, but this cannot be considered as of great value in the present problem. The unit allowance in the case under consideration may be called an arbitrary one, though it is within the two extremes given in the article cited.

CALCULATING FILTERING SURFACE

In my opinion, the most rational method of arriving at the requisite amount of filtering surface is to base calculations on the volume of gas to be treated. Depending on whether it is desired to collect all the dust in the bag-house or whether it seems preferable to settle as much of it as is possible in the flue

quent smaller volume of air. Naturally the volume of gases delivered by the one furnace will be much greater than the second. On consideration it will be appreciated that there are many factors, all of which assist in making the tonnage basis an unreliable one.

Referring, then, to the volume of gas to be handled, the present bag-house provides an area of 3.823 sq.ft. per cu.ft. of the maximum volume of gas for which provision was made, and 4.716 sq.ft. per cu.ft. of the starting volume of 55,000 cu.ft. per minute.

RESULTS OF OPERATION

The remarks and data which follow are

the result of inquiry and observation at a time about a year after the bag-house was first placed in commission. The concrete of which the building and part of the flue system is constructed shows no sign of deterioration, and is apparently in a perfect state of preservation. The inlet flue, between the fan and the bag house, and the lower part of the main building are faced with the special tiling, which gives every promise of affording full protection to the building against any and all acid action to which it may be exposed. The steel doors provided for the lower part of the building were discarded in favor of brick stoppings, these affording a tighter doorway; being infrequently opened, the additional expense is negligible. The steel doors on the bag floor and at the top of the bag chamber were made each into one piece, and secured by bars wedged behind the hinge irons that were imbedded in the walls. The change in these doors was for the same reason that the change to brick was made on the ground floor. The prepared roofing which was used proved to be practically a failure. A reinforced concrete roof would, it is thought, prove most satisfactory, but the trusses are not sufficiently heavy to permit the change to be made. The arrangement of flues originally designed was not found to work satisfactorily, and was, therefore, subsequently modified. As built, the flue alongside the bag-house was divided into an upper (inlet) flue, and a lower (outlet) flue. The inlet flue was designed to carry the entire volume of gases discharging into the building, whereas the outlet flue was planned to receive only the gases generated in burning the fume or dust collected in the lower part of the building. To accomplish this, each flue was provided with openings connecting with the various transverse compartments into which the lower part of the building is divided. Experience has shown that this plan was impracticable for two principal reasons: First, the moisture contained in the gases gives rise to corrosive action, which soon renders the steel dampers useless, as it is impossible to close them. Second, the discharge of the gases arising from the combustion of the fume through the separate flue afforded no distinct advantage, as the bag chamber was inaccessible so long as there was any gas passing through any of the bags. It has been suggested that the bag chamber be divided into at least three compartments by introducing transverse walls extending to the top of the chamber. One compartment could then be used exclusively for the gases from the furnaces other than the blast furnaces, and the remaining two could be used alternately for the blast-furnace gases, thus permitting inspecting and repairing at any time without hindrance to the regular operation.

CAPACITY AS SHOWN BY EXPERIENCE

In connection with this last statement

the capacity of the plant may be further considered. Experience has demonstrated that the originally planned maximum temperature was too high for regular practice. For some time past the entering gases have been kept at from 112 to 114 deg. F. This has resulted in a somewhat longer life for the bags. The pressure produced by the fan has also been somewhat reduced, being now maintained at 0.625 oz. In lowering the temperature of the gases an additional burden has been imposed upon the fan by reason of the large volume of cold air that is introduced. The fan wheel is now driven at a speed of 116 r.p.m., at which, with the lower temperature, the volume of gases is 76,000 cu.ft. per minute, and the power consumption about 24.75 h.p. There is, therefore, a present provision of 3,413 sq.ft. of filtering area per cu.ft. of gas entering the chamber. Referring to the statement regarding the suggested division of the bag-chamber, it seems safe to say that an allowance of 1.14 sq.ft. of filtering surface per cu.ft. of gas is ample.

Small Cyanide Plants

SPECIAL CORRESPONDENCE

In many mining districts small cyanide plants are owned and operated by working miners and tributors. In Australia and New Zealand such plants are very numerous and do effective work. In the Cotter country and in Victoria the owners of such plants refused to pay royalty to the owners of the cyanide patents and caused the governments to acquire the cyanide rights for their respective states. Similar plants are successfully worked in Rhodesia. Walter Broadbridge states¹ that the Lydia Glenorchy mine, situated in the Hartley district, Rhodesia, is furnished with a reduction plant consisting of four Huntington mills and eighteen 10x4-ft. direct-treatment cyanide tanks. Each mill crushes about 500 tons of ore per month. Four white men, including the manager, run the works. The total expenses average £750, while the profits for last June amounted to £550. It is a typical bush mill with crude methods, but the working costs are under 8s. per ton, which, considering the circumstances, is very creditable.

The Rouge mine in the same district has a five-stamp mill and galvanized-iron cyanide plant. It is working ore worth £2 per ton at a cost of 15s. 6d. per ton, which includes mining and development work.

A plant to cost £500 is being erected at the Yellow Jacket mine to treat ore valued at 32s. per ton.

Excellent results are obtained from these cheap, roughly made plants. They are generally in charge of men who have gained experience in cyaniding on well-equipped plants and who endeavor to fol-

low the methods adopted in the large plants as closely as possible.

It is necessary to use a number of small vats instead of a few large ones for various reasons. Sometimes double treatment is found necessary, the sands being shoveled from one tank to another. Small tanks are also cheaper in first cost than large vats and are more easily transported. It is quite common in Rhodesia for the plants to be removed to different claims.

The general method used in building the tanks is as follows: The iron sheets are rolled in a shop and transported to the mine where they are built in position. The bottoms are generally laid on 2 to 3 in. of well-tamped tailings and built of slightly heavier gage than the sides. These and the bottoms are double-riveted and soldered inside and out. When above 4 ft. in height they are strengthened on the outside by ½-in. round-iron bands with 18-in. spaces. Before being used they are either painted or tarred. The sands are discharged after treatment by shoveling over the sides into trucks.

Drift Mining in California

SPECIAL CORRESPONDENCE

There has not been much activity of late, nor is there at present, in the mining sections of the Forest Hill and Iowa Hill divides in Placer county, Cal., best known for the extensive drift mines, of which the Hidden Treasure is the most important. Some of the larger mines have been worked out, and not many new ones have been opened in recent years. In fact, working gravel by drifting as well as by hydraulicking is by no means the important industry in California that it formerly was. In drift mining there is very large preliminary expense before there is any chance of profit. Expensive bedrock tunnels must generally be run under the lava-capped divides to reach the buried river channels which carry the gold, and there is a chance of loss if the gravel tapped happens to carry less gold than expected. The regular channels of the main buried rivers are usually rich enough to mine profitably, but sometimes poor sections are tapped by the tunnels. Again, the tunnels are sometimes run too high to tap the channel and drain it properly. The residents of the Forest Hill divide are somewhat encouraged just now, as new money is being applied to mines which have been partly opened up, but for want of capital or energy have been unworked for years. Of this number are the Dardanelles, Pond, Red Sea, Peckham Hill & Gray Eagle, Missouri and Vier. The Paragon and Grennel claims are also being equipped. Considerable money is needed in this class of mining which the local people are unable to supply, so there is abundant opportunity for the investment of outside capital.

¹Bulletin No. 40, Inst. Min. and Met.

Filtration of Slimes at El Oro, Mexico

By D. L. H. FORBES*

A new idea in slime filtration has recently been developed and successfully put into operation at the plant of the El Oro Mining and Railway Company, Ltd., El Oro, Mexico. The credit for this belongs to Edwin Burt, superintendent of the El Oro company's cyanide department, who has patented the idea; and to the progressive management of the company which was quick to appreciate the value of the

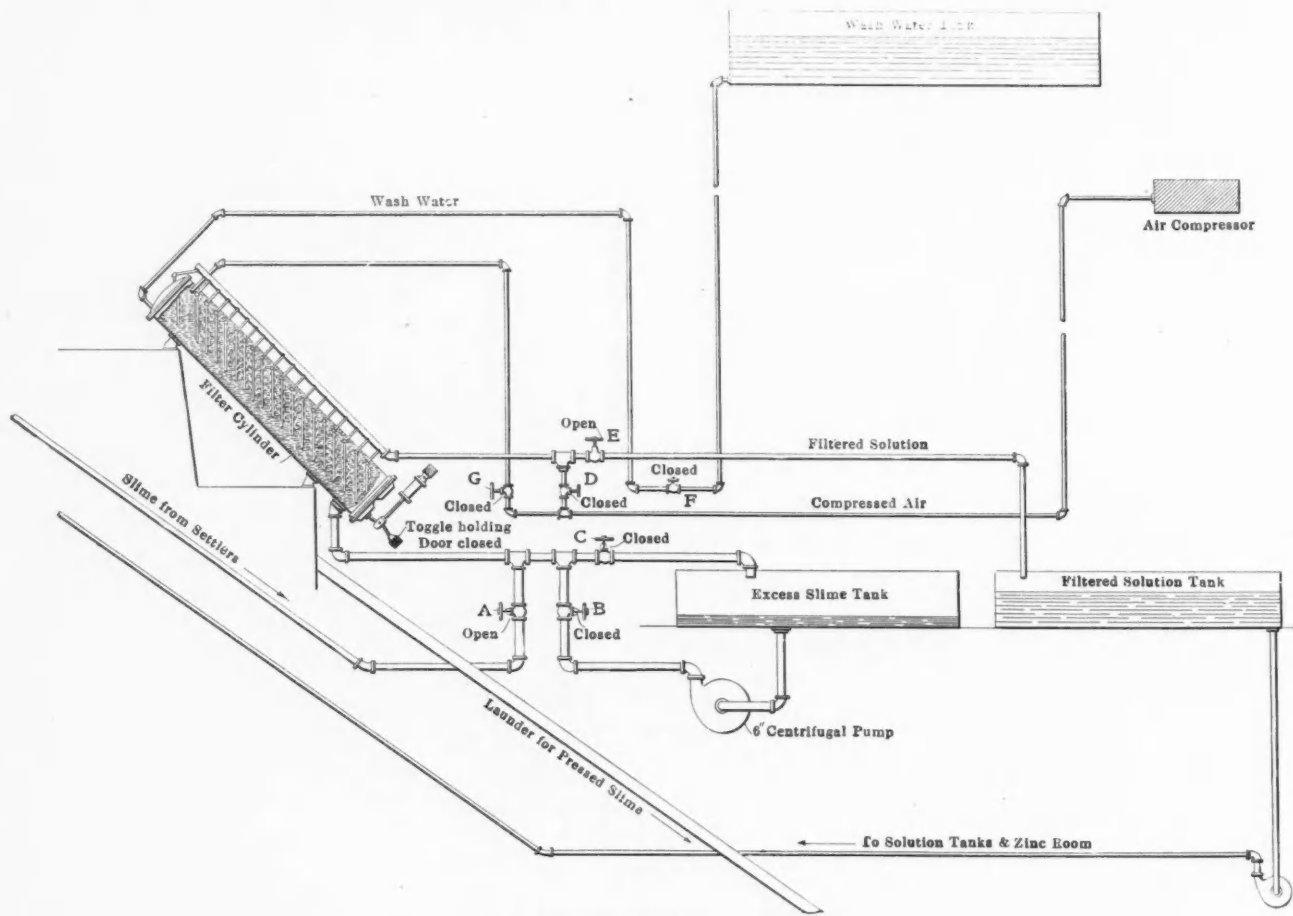
DETAILS OF THE PLANT

The El Oro filter battery at present consists of five units. Each unit has 18 filter leaves suspended in a steel-plate cylinder, set at an angle of 45 deg., with a door at the lower end. The leaves are made by bending two lengths of ½-in. standard wrought-iron pipe and connecting them into a pear-shaped frame by means of a swiveling, water-tight T-joint at the upper end, and a 4-in. piece of ½-in. rod at the lower end. Holes ⅛ in. in diameter are drilled at intervals of 2 to 3 in. on the inside edge of the frame and a piece of cocoa matting is sandwiched between two pieces of heavy canvas filter-cloth, which

movement when slime or wash water is in motion in the cylinder, and saves the connections from leaks that would otherwise be caused by bending strains. Counting both sides, each filter leaf has an effective filter surface of 13.5 sq. ft. One leaf at each end is somewhat smaller than the others in order to hang clear of the cylinder-head.

The steel cylinders are each 20 ft. long by about 42 in. inside diameter, and are built up of 5/16-in. tank-steel plates with cast-iron flanges at the ends, to which are bolted heavy heads of cast iron.

The head at the lower end consists of two pieces. The main frame of the head,



VERTICAL SECTION OF FILTER PLANT

scheme, and to give Mr. Burt assistance in working it out.

Batteries of Burt filters similar to the one to be described are also in successful operation at the eight mills of the Dos Estrellas company and at the mill belonging to the Mexico Mines of El Oro Company.

The Burt filter employs a number of filter leaves suspended in a steel shell and so arranged that the operations of forming the slime cakes, washing the cakes and discharging them can be performed without manual labor and with only a small expenditure for power.

*Esperanza Mining Company, El Oro, Mexico.

are bound and sewed over the pipes. The pieces of canvas, with the matting between, are held firmly together by stitching them with a sewing machine. One man is kept constantly at work making new leaves and repairing old ones.

The swiveling T-joint of the leaf is connected through the top of the shell with a 4-in. pipe running above it and parallel with its axis. This serves as a solution header. Each filter leaf has its individual pet-cock and valve in front of the header so that the quality of its filtrate may be tested at any time, and it may be cut out for replacement with a new leaf if found unsatisfactory. The swiveling T-joint allows the leaves a certain

which is bolted to the cylinder flange, has a semi-circular opening for a door which is hinged horizontally from it. This door has a bead projecting from its inner face all the way around it, and engaging in a corresponding groove packed with rubber in the main frame of the head. The door is opened and closed by means of a toggle mechanism operated by the piston-rod from a hydraulic cylinder hung above it.

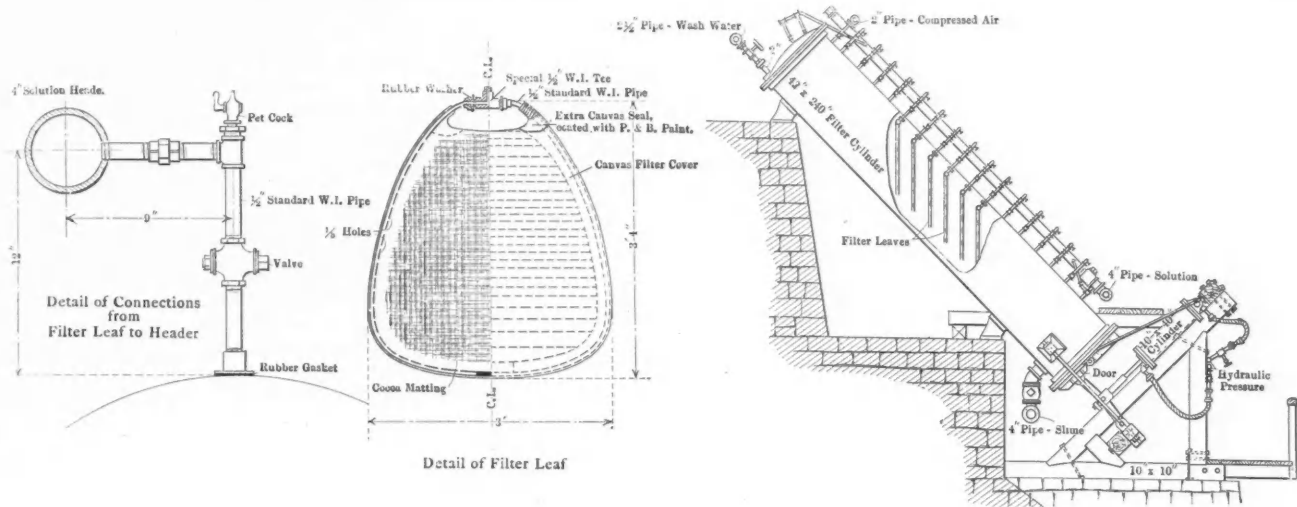
METHOD OF OPERATION

The five filters are worked together in a battery, the valves, which are of the quick-opening type, being conveniently arranged in a little building at one side of the battery. The arrangement of the

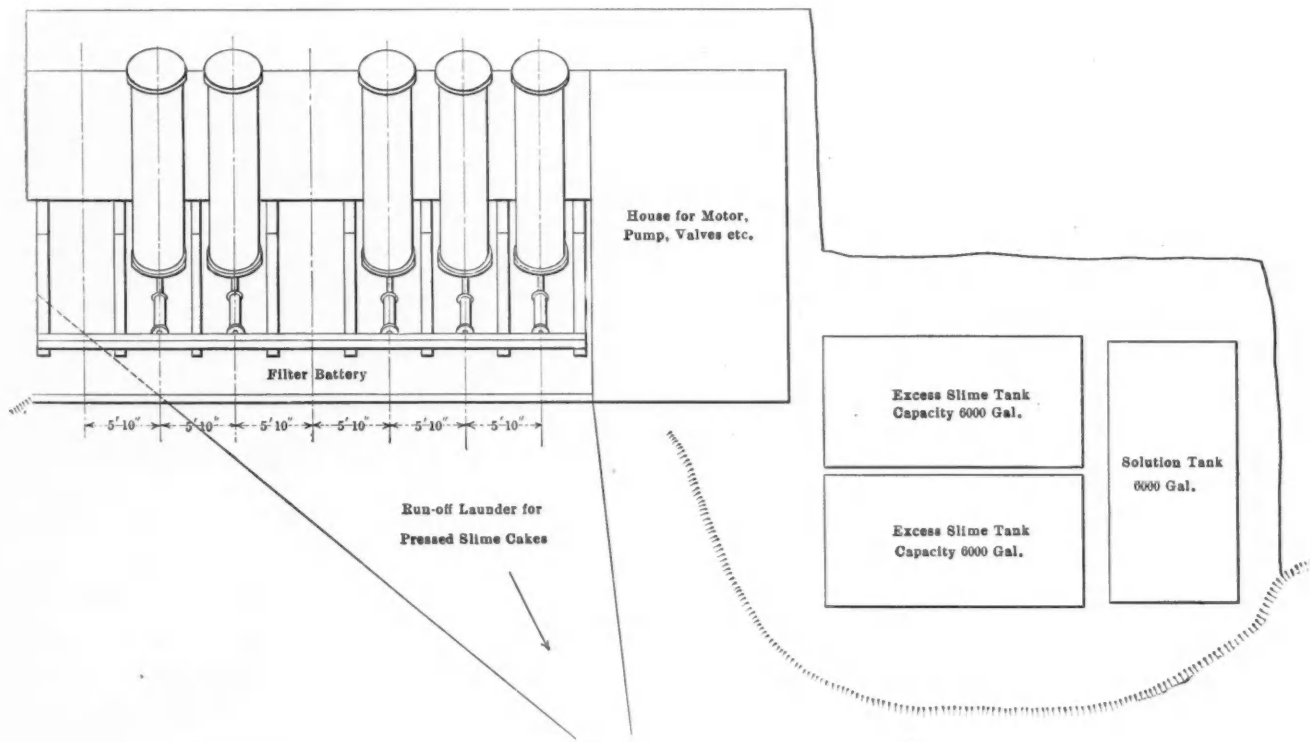
valves during the first stage of the filter operation is shown diagrammatically in the accompanying vertical section. The slime-settler tanks are at an elevation which gives an effective pressure of 60 lb. per sq.in. at the filters. After the doors have been closed by admitting water to the upper ends of the hydraulic cylin-

is closed and valves *C* and *G* opened. This forces the excess slime from the cylinders into the slime tanks, of which there are two, having a total capacity of 12,000 gal. At the same time the compressed air, which is under a pressure of 70 lb., aids in driving moisture from the cakes which have formed on the filter

the meantime. A jet of wash water from the upper end of the filter, admitted by opening the valve *F* for a few seconds, clears out the last of the slime cakes and finishes the cycle. The doors are closed, the 15-h.p. motor, which drives the 6-in. centrifugal pump, is started, and the excess slime sent back to the filters. As



SECTIONAL ELEVATION OF BURT FILTER; DETAILS OF FILTER LEAF AND HEADER CONNECTION



PLAN OF FILTER PLANT

ders, the valves *A* and *E*, slime and solution valves, respectively, are opened. The filter cylinders then fill with slime under pressure and the filtrate is forced through the solution pipes into a tank having a capacity of 6000 gal., from which it is pumped up to the zinc room.

After about nine minutes the valve *A*

leaves and forces the last of the filtrate through to the solution tank. After about eight minutes the valves *G* and *E* are closed and valve *D* is opened. This admits compressed air to the inside of the filter leaves and knocks off the slime cakes, and the material runs out through the door at the bottom which has been opened in

soon as this has been done, the slime under pressure from the settlers is admitted and the cycle of operations, as described above, is repeated. Each cycle takes 20 minutes. The cakes formed are from 2½ to 3-in. thick and carry about 30 per cent. moisture. The slime coming from the settlers is about 80 per cent. water.

COST AND EFFICIENCY

The filter leaves at the mill of the Mexico Mines company have to be cleaned occasionally by washing with dilute hydrochloric acid, but so far this has not been found necessary at the El Oro mill.

The five filters have a total effective filtering area of 1170 sq. ft., and treat from 600 to 650 tons of dry slime per 24 hours. From this the capacity per square foot of filter surface per 24 hours may be reckoned to be 0.53 tons.

It will be noticed that the slime cakes are not washed with water. This is owing to insufficient filter capacity at present. The length of time required for a complete cycle would be increased to 45 to 50 minutes if a water wash were given. A substantial saving from the material treated could easily be made in this way, however, as the slime cake going to waste at present assays around 0.57 pesos in gold and 0.7 oz. silver, or a total value of 1.36 pesos per ton, of which value I should estimate that 10 to 15 centavos is carried by the solution left in the cake, and consequently could be extracted by washing. To do this would require the addition of six filters to the battery.

The plant requires very little power, as the force of gravity does most of the work of filtration. The 15-h.p. motor is run only about one-quarter of the time, and electric power costs \$0.00765 per kilowatt-hour. The total cost per day for treating 600 tons of dry slime is about as follows:

Labor, 2 operators at 2 pesos.....	4 pesos
2 helpers at 1 peso.....	2 "
1 filter maker at 2 pesos.....	2 "
Total.....	8 "
Supplies and renewals.....	3.50 "
Compressed air and power.....	8.00 "
Total.....	19.50 "
Cost per ton 0.032 pesos, or about 1.5c. U. S. currency per ton of dry slime treated.	

The total cost of the filter installation, including preparation of the site and erecting, was about 14,000 pesos, which is a remarkably low figure, considering that this was the first of its kind to be built, and that it had to stand all the extra costs incident to pioneer work.

Tungsten in California

SPECIAL CORRESPONDENCE

The representative of a foreign steel corporation has been some little time in the region of Randsburg and Johannesburg, in Kern county, California, examining various tungsten deposits which have been found there. Some of them, notably the Atolia, have been pretty well developed into productive mines, but most of the claims have not had any extensive work done upon them as yet. It is expected that upon the report of the expert some of the more prominent tungsten mines may be purchased by the foreigners.

Short Talks on Mining Law—IX

BY A. H. RICKETTS*

Until the passage of the law affecting mining claims in the Philippine Islands (1902), there was no legislation by Congress conferring a right upon a claimant to all the minerals that might be contained within a location, whether lode or placer. The Mining Act prevailing in the United States (1872) gives the exclusive right of possession to the surface and only to all veins or lodes, having their apices within a lode location, and to all placer deposits and unknown lodes or veins within a placer claim, without right to a "known vein" therein unless secured by separate location or included in an application for patent. Otherwise, the "known vein," together with 25 ft. on each side thereof, is subject to adverse location. The right to mine is limited to the exterior boundaries of the placer claim, except as to the "known vein," so appropriated. In the Philippine Islands the security of the mineral claimant seems to be greater than in the United States, for the law there does not qualify his ownership by providing possible rights to another in lode or placer claims under the "law of the apex" or of "known veins."

TRESPASS AT SURFACE

In the United States an intrusion upon the mining claim of another may be upon or underneath the surface. It may be the result of design or mistake, or possibly it may be sanctioned by the "law of the apex." While no one can initiate a right by means of a trespass, that is by an unlawful entry, still, the making of an overlapping or conflicting claim is not uncommon. If peaceably made, it may serve to secure sub-surface rights not otherwise obtainable, even to the prejudice of the senior location, for it is permissible under the law to include irregularly shaped ground, such as an isosceles or truncated triangular, or a many-sided piece to which no extra lateral rights would otherwise attach, within the surface lines of a parallelogram having parallel end lines, all the boundary marks of which are placed on other claims. It is immaterial whether or not one or more of such other claims are patented, or whether mineral or not in character. Of course, no right to the surface of the territory thus encroached upon, is thereby initiated, but, if the land outside of the senior location and within the lines of the junior location includes the apex of one or more veins that dip within the intruded premises, the owner of the younger title has the right to follow these veins and to mine the ore in them unless the surface is included in a senior agricultural patent.

In case the prior mineral claimant has

*Member of the San Francisco Bar, San Francisco, Cal.

previously extracted the mineral from such a vein, the subsequent locator has no legal redress, as it is an injury without damage to them. Such act, however, renders the senior locator liable to the Government in an action for trespass, as his right to remove mineral from a lode claim is limited to veins having their apices within his location. Thus it is possible that, strictly speaking, a mine owner may become a trespasser upon his own domain, whether it is held by location or under a patent. The presumption, however, always is that the latter has the title to all mineral within the exterior boundaries of his claim.

The junior locator does not acquire title to the surface within the overlap because of the subsequent abandonment or forfeiture of the elder claim, as in that sense the overlapping location was prematurely made, but whether these contingencies have happened or not he may obtain title thereto by including the same within the exterior limits of his claim as located in an application for patent therefor, provided it has not been previously patented, or there are no "adverse proceedings."

A trespass may be willful, as when the entry upon the land is with intentional disregard of another's right, or it may be innocent, as when it is unintentional and in the honest belief of a right. The action may be brought by anyone in the actual or constructive possession, at the time of the commission of the trespass, whether as the owner or as a lessee of the claim.

TRESPASS UNDERGROUND

An underground trespass may be open or secret. In the case of a secret trespass the courts are not in accord as to whether the statute of limitations begins to apply from the time of its occurrence or from the time of its discovery by the injured party. A trespass either upon or underneath the surface may consist of a single or continuous acts. When the trespass involves the removal of mineral, it has been held that when the trespass is willful the measure of damages is the full value of the mineral without deducting the cost of mining, reduction, etc., but that when the trespass is innocent in its nature the trespasser is entitled to such deduction. The question of damages, however, is never determined on the basis of profit and loss, and the fact that the value of the mineral extracted may be less than the expense of extracting it does not enter into the case. The trespass being proved the plaintiff is entitled to at least nominal damages.

The mineral when severed becomes personal property and the action for damages may be for its value and the "breaking of the close" or the damage may be limited to its value, or the action may be for the recovery of the mineral. If for its value, or for its recovery, the action may be brought wherever the defendant may reside or wherever the mineral may be, irre-

spective of the location of the property from which the mineral was extracted. It may be said that it is never possible to recover the true value of the mineral removed.

INJUNCTIONS

In injunctive proceedings on the ground of alleged trespass, since the basis of the proceedings is the irreparable injury the plaintiff will sustain, the doubt should be resolved in favor of granting the writ. From the nature of the case the courts are more liberal in granting the writ in mining cases than in those affecting other real estate. The following are some of the instances in which the writ has issued: To restrain the extraction or removal of mineral; the deposition of material upon a claim, as tailings or debris; the working of a mining claim, as the sinking of shafts, the running of tunnels; intrusion on a mining claim; or to restrain work because a menace to navigation or the property rights of others, as in hydraulic mining where the tailings go into a river, or phosphate mining in a river. No injunction will issue against a person who is not committing an act or who has not threatened to do so.

WASTE

"Waste" is the unlawful extraction of mineral and the conversion of the proceeds thereof, whether by mistake or by willful or fraudulent trespass. Its effect is to deprive the owner of the substance of his estate and may be enjoined. The draining of a property of another of its oils or gas by one working his claim more expeditiously than the other, does not constitute waste.

In the absence of a local statute or of an agreement between them, a co-owner of a mining claim may work the property without being charged with waste or being subject to an injunction. He is liable, however, to the non-assenting co-owners for their *pro rata* share of the net results. But he has no claim for contribution from them, except perhaps in a partition suit where the court may adjust the equities between them. As a rule, he must alone sustain any loss which results from his working of the claim, and, of course, the interests of the others not joining therein are not subject to the debts he may contract thereby.

Hostility of possession under claim of title exclusive of any other right may conclude the right of excluded co-tenants if continued for sufficient time without interruption, but "continuously" and "uninterruptedly" are not in law exactly synonymous. For instance, there may be a continuous adverse use of a property for a sufficient time under the law to comply with the statute of limitations, yet it may be interrupted by the bringing of an action in ejectment before the expiration of that period. This would not break the continuity of use until final judgment, although

the running of the statute would be interrupted by the bringing of such action.

Co-tenancy arises from joint location, purchase or descent. It may be merged into a mining partnership when two or more of the co-owners jointly engage in the actual working of the mine, although there is no express agreement between them to that effect. It is not essential, however, that the partners shall be co-tenants. The main distinction between a mining and an ordinary partnership is that in a mining partnership the death or bankruptcy of a partner or the sale of an interest does not dissolve that relation between the survivors. The incidents of such a partnership are regulated by local statute.

"GRUB-STAKE" CONTRACTS

A "grub stake," or as it is less often termed a "prospecting contract" or a "joint adventure," is an agreement between two or more persons, not necessarily reduced to writing (except in the State of Nevada) by which one agrees to equip the other with such outfit as may be required by the other in the search for unclaimed valuable mineral deposits, in consideration of being given an interest in all claims located, or otherwise secured, by the latter during an agreed time. Such a contract is in the nature of a qualified partnership. To be enforceable the "grub stake" contract must show adequate consideration and be just and reasonable. It has been held that it is essential in order to have a right in property under such a contract that such property shall be acquired by means of the "grub stake" furnished and pursuant to the "grub-stake" contract. Parties to a "grub-stake" contract are trustees for each other but are not necessarily co-tenants, though they have been held to be such, nor are they necessarily mining partners, but those relationships, or either of them, may arise by the acquisition of property under such a contract and the joint working of the property. The contract may expire by limitation or be terminated by mutual consent or at the pleasure of either party, as its terms may permit. An agreement to pay wages to the searcher while looking for property and to give him an interest in the same when found, does not constitute a "grub-stake" contract nor a mining partnership. It has been held to be a pure contract of hiring. An agreement to the effect that a claim shall be located in the name of both parties thereto raises a resulting trust where the claim is afterward located by one to the exclusion of the other.

In the deep alluvial mines of Victoria trouble is experienced during periods of falling barometer from the escape of gas from the gravel. To obviate this, air locks are used; by blowing air behind the doors the pressure is increased so that the gas cannot flow from the gravel and so interfere with the work.

Asbestos in Quebec

BY FRITZ CIRKEL*

The principal asbestos-producing districts in Quebec are the East Broughton and Black Lake districts. In the former locality the Boston Asbestos Company employs 35 men at its new 250-ton mill at East Broughton, and the Frontenac Asbestos Company is completing its 300-ton plant on the lot adjoining the village. The Eastern Townships Asbestos Company closed its new mill during the winter in order to make alterations. It is now producing from 12 to 15 tons of asbestos per day with a force of 40 men. The Quebec Asbestos Company has been working its force of 45 men double-shift in order to fill its contracts for delivery. After a shut-down of four months the Broughton Asbestos Fiber Company is preparing to work its mine and mill on a large scale, and expects to produce a carload of asbestos per day. About 60 men are employed.

There has been some activity on new properties recently. Lot 13, range 8, of Broughton, belonging to A. Taschereau and others of Quebec, has been acquired by a company now in course of organization. It is planned to build a large mill and to start extensive mining. The property adjoining the Broughton asbestos mines and known as the Tanguay property has been bought by M. Deschene, of Beauceville, who will erect a mill this summer. The Miller mine on lot 13, range 4, has been sold to M. T. Turgeon, of Beauceville.

The asbestos property forming part of lot A of Coleraine, situated at Black Lake and belonging to the Black Lake Chrome and Asbestos Company, was recently sold to Sheriff Langelier and Mr. Larue, of Quebec. This property is crossed by the Quebec Central railroad, and offers excellent transportation facilities. The Union asbestos mine, belonging to Calmon & Co., of Hamburg, Germany, has been started again, after a shut-down of three years. The mill has been thoroughly overhauled and is treating rock from the mines situated at the crest of the big Black Lake hill. The Dominion Asbestos Company, which has acquired a part of the holdings of the Standard Asbestos Company, is about to commence work in the mine and mill. The mill is reported to be the largest in the district and treats about 500 tons of asbestos rock per day. It is expected that the mine and mill will soon be in full operation. The Johnson Asbestos Company, of Thetford, has completed its new mill which has been building for more than a year.

Detailed cost systems enable a mine manager to quickly locate the waste.

*Mining engineer, 80 Stanley street, Montreal, Canada.

Pyritic Smelting in Tilt Cove, Newfoundland

Early Experiences in Producing Matte from Pyritous Ores without Fuel. Campaigns Were Short, Concentration Low and Costs Small

BY F. S. NICHOLLS*

During the years 1894-97, I was engaged in smelting a pyritous ore, without coke, at Tilt Cove, Newfoundland. Unfortunately, I have not the figures by me for the whole of that time, but, for the 12 months ending August 29, 1896, I have full particulars. During that year, in 294 days we smelted 40,133 tons of ore with a cold blast, and without coke or other fuel. Coke was required for the forehearth or settlers, to smelt foul slag, and to start the furnaces, which only worked six days a week. The total amount of coke used for these purposes for the 12 months was 806½ tons.

cost of coke at the plant, that this form of reduction was too expensive, experiments were conducted, in the same furnaces, with a view to reducing the ore without coke. These experiments were entirely successful, and the smelter was removed to a site near the mine, in order to save transport cost, and also to do away as far as possible with the smoke nuisance, which was so bad at times that people could not live near the works.

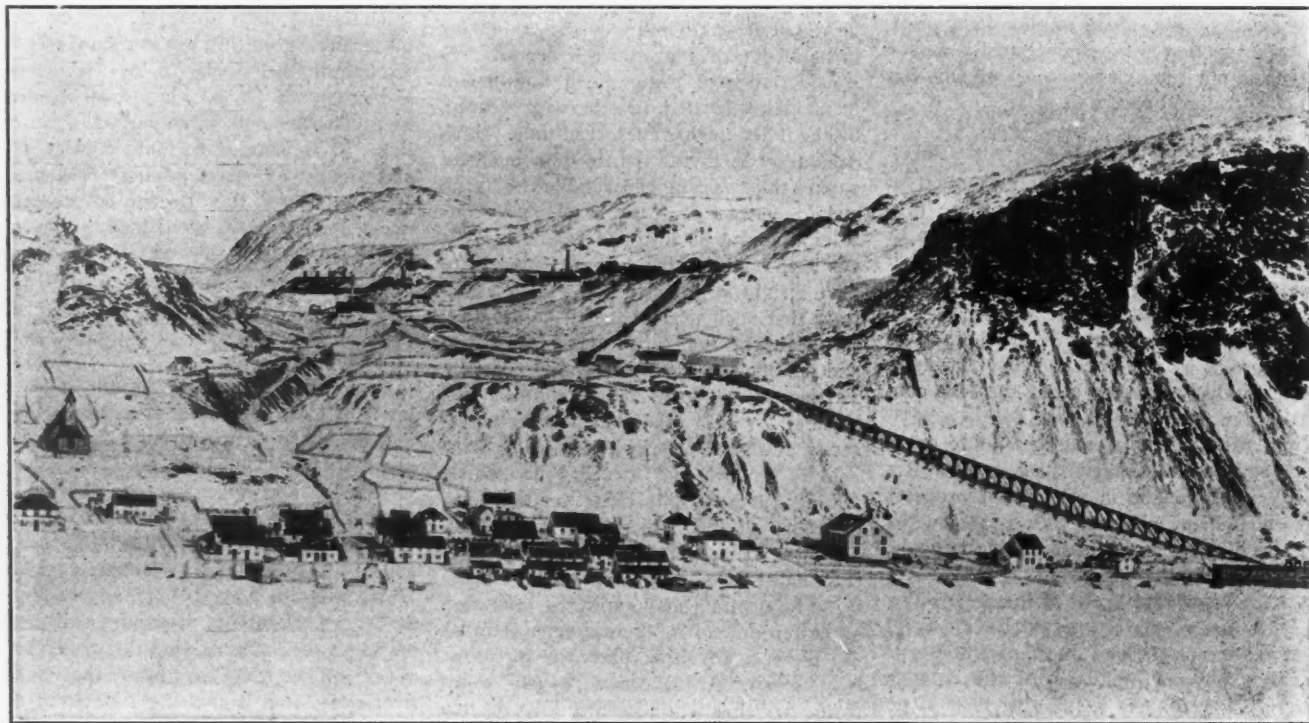
FURNACE AND METHOD OF OPERATION

On January 1, 1895, two furnaces were blown in, and later a third and fourth

the works. The tuyeres were of copper and were water jacketed.

The ore as it came from the mines was all passed through a crusher, and broken to about 4-in. cubes, but it did not matter if it sometimes came through larger; in fact, we used up a three-years' accumulation of worn out jaws that had been scrapped, these breaking the ore small enough for our purpose. The greater part of the fines was screened from the ore as it left the breaker, but about 8 per cent. of fines always found its way to the feed floor.

The forehearth or settlers used were



TILT COVE, NEWFOUNDLAND. MINE AND WORKS IN BACKGROUND

The ore at the Tilt Cove mines is a low-grade pyritous ore, the analysis of which is as follows: Copper, 3.69 per cent.; sulphur, 34.98; iron, 37.06; silica, 13.23; alumina, 2.47; lime, 0.55; magnesia, 0.0465; arsenic, 0.0107; antimony, 0.1163; nickel, 0.3927; cobalt, trace; oxygen and loss, 7.218 per cent.

Previous to 1895, the ore was crushed, roasted in piles and stalls, and afterward smelted in small brick cupola blast furnaces of about 50 tons daily capacity, the resulting matte being shipped to Swansea. It having been decided, owing to the high

*Metallurgist, Ausserfelden, Salzburg, Austria.

were started. The furnaces were exceedingly simple in construction, being merely a round shaft of firebrick with plates to support the stack. They differed from the furnaces formerly used to smelt roasted ore only in the number of tuyeres, and the distance between the ring and feed plate. The ordinary furnace had three tuyeres, and measured 72 in. between ring and feed plate, while the pyritic furnace had eight tuyeres, and measured 24 in. between ring and feed plate. The bustle pipe was of galvanized sheet iron, the tuyere pipes of painted canvas, and the nozzles were made of tin plate. The tuyere pipes and nozzles were made in

made by tamping coke dust around a mold, set in an outer casing of cast-iron plates. These settlers would last from three to six days, or longer if repaired. They were renewed so easily that we seldom troubled to patch them.

Five men worked a furnace; one wheeled the ore to the charging door, another fed the ore into the furnace with a shovel, one man worked the furnace and made his settlers, while the remaining two kept the matte and slag clear. The furnaces were run from 6 a.m. Monday morning till 6 a.m. the following Sunday morning when they were blown down. We found it more economical to work in

this way than to smelt continuously; it also gave the men a welcome respite from the smoke which was sometimes unbearable.

EFFICIENCY AND ECONOMY

To start the furnaces, a fire of cord-wood was first made on the hearth; on top of this about 500 lb. of coke was dumped. When this was burning brightly, about a ton of ore would be shoveled in, and when hot the ore would be increased until the furnace was full to the feed plate. When the ore started burning, about 4 oz. of blast would be put on, and in about 30 min. the normal blast, 12 oz. The blast was supplied by two small Root blowers. When the operation was fairly under way, all that remained to be done was to keep on feeding ore, and to remove the matte and slag as the charge

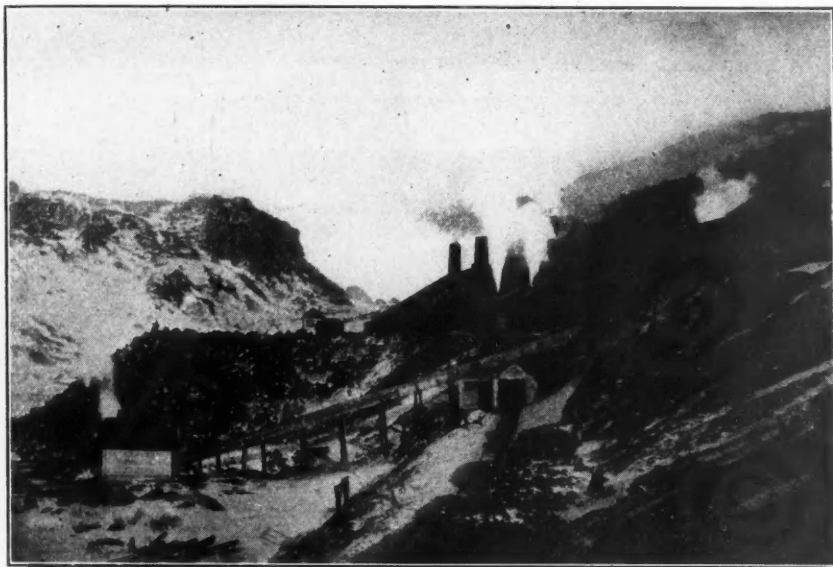
cheaply done. During the year ending August 29, 1896, in 294 days we smelted 40,133 long tons of ore. The ore averaged 3.41 per cent., while the matte averaged 7.06 per cent. copper. The total cost for breaking, transportation of the ore to the smelter, smelting, placing the matte in piles for shipment, including labor and materials, was \$55,053, or \$1.37 per ton of ore.

Matte was sometimes produced containing up to 18 per cent. copper, but this only occurred when we had a better grade of ore with quartz mixed through it. How far the addition of silica to the charge, or the use of hot blast, would have affected the grade of the matte I never ascertained. Experiments were conducted in South Wales in bessemerizing this low-grade matte, which were entirely successful. No difficulty was experienced in blowing the

operations there has been a constant reduction in working costs. For 1903 they were \$2.94 per ton, and have now come down to \$1.554. The bullion sales for the past year show a reduction compared with 1907. The principal causes of this reduction were continued heavy falls of ground and a consequent large quantity of overburden, which could not be separated from the ore, thereby lowering the grade of ore sent to the mill.

The ore reserves are estimated at 415,729 tons, but the value is not stated. Complete technical statistics are given. The working expenditure is analyzed as follows: Mining, \$0.4656 per ton; tramming, \$0.0948; milling, \$0.3748; cyaniding, \$0.4128; general charges, \$0.2060; total, \$1.5540 per ton. The assay of ore sent to the cyanide works was 0.1383 oz. gold per ton, and the assay of residues was 0.03595 oz., giving a theoretical extraction of 74.015 per cent.; the actual extraction, calculated on the difference between the gold called for by assay and the gold recovered, was 74.48 per cent.

The profit on working account was absorbed by charges under the heads of depreciation, mine development and London expenses, and an adverse balance of £1288 was carried to balance sheet; so that, in spite of the low costs of working, the stockholders got no dividend.



SMELTING WORKS, TILT COVE. SLAG DUMP ON LEFT

came down. The slag was basic and carried usually about 0.25 per cent. copper.

As long as the ore in the furnace kept up a continuous cracking, and gave off dense volumes of smoke, the furnace was all right; but it was a sure sign that things were going wrong if that cracking stopped. The only time we had trouble was when considerable barren rock came down with the ore. This would happen sometimes, for it was extremely difficult to sort it all out on the crusher feed floor, the ore from some of the stopes being very wet and mucky. When this happened the rock would not melt, and we would have to cut down the mass in the shaft of the furnace with bars. Then some foul slag would be fed in with about 6 per cent. of coke and the furnace washed out. After this we continued smelting ore, but coke was never fed in with ore. As a matter of fact the ore would melt more easily without than with coke.

The concentration was low, not much more than two into one, but it was

matte up to 50 per cent. copper in a converter made in the works, sand being blown in with the blast.

The original experiments in pyritic smelting and converting were carried out by my father, T. D. Nicholls, the inventor of the "direct refining process."

A Low-grade Rhodesian Gold Mine

SPECIAL CORRESPONDENCE

The report of the Wanderer (Selukwe) Gold Mines, Ltd., owning a large mine in Rhodesia, is an example of profitable working of very low-grade ore. For the year ended April 30, 1908, there were 190,377 tons of ore treated, from which bullion to the value of £83,201 was recovered. The yield per ton was \$2.0966, the working expenses \$1.5540, and the profit \$0.5426. The low costs are obtained owing to the mine being largely an open quarry. Since the commencement of

Improved Adair-Usher Process

The latest modification of the Adair-Usher process is to enable it to treat a pulp containing as much as 75 per cent. sand and only 25 per cent. slime. Its inability to treat sandy slimes was the cause of the abandonment of the process at Pachuca, Mexico.

The improved plant consists of ordinary decantation vats having cone bottoms arranged in series, the bottom of the one above being 2 ft. higher than the bottom of the one next below. Each tank is provided with an outflow at the bottom and an overflow at the top. The entering sand and slime flows into the tank through a distributor near the top. The solution enters through the type of radial distributor, used in this process, placed about the middle of the vat. The number of vats used depends on the richness of the ore and the treatment period necessary.

In operation the necessary pulp slowly settles in the rising current of solution, while the enriched solution flows out from one vat to the solution distributor in the next vat below. The pulp, as it accumulates in the cone bottom, slowly feeds, by means of an injector, to the pulp distributor at the top of the next vat above. From the highest vat the pulp can be discharged either to a settling tank, or to a filtering plant. Thus the solution travels from one vat to another by gravity, while the sand travels upward in the opposite direction.

Ore Sorting at the Cabrestante Mine, Santa Barbara, Mexico

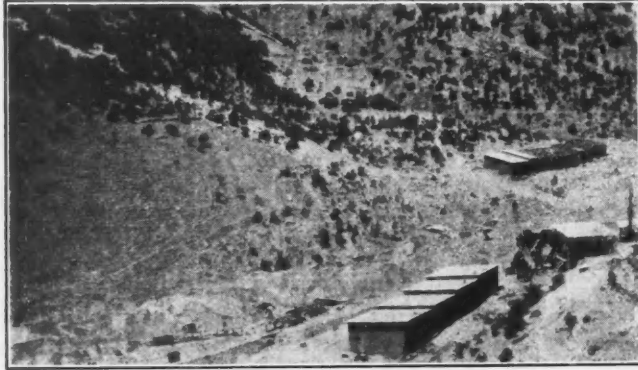
BY CLAUDE T. RICE

The ore in the Cabrestante and the adjacent mines belonging to the Montezuma Lead Company is, in the upper levels,

and sorted on contract. The method of hand-sorting described later is quite typical of the un-modified Mexican procedure. It is the method that is used at the Palmilla mine, a relic of Pedro Alvarado, which has been retained by the new company, and also at Pachuca, Zacatecas and other camps in Mexico.

The Mexican prefers to sort on a level

etc., are used it is difficult to obtain as good an inspection of the finished work. It, therefore, appears that the Mexican mine owner was wise in his choice of a *patio*, and the American engineer will do well to retain this simple Mexican method when close sorting is required. When a large tonnage of roughly sorted material is desired, then a traveling belt or some



GENERAL VIEW OF HIDALGO PATIO



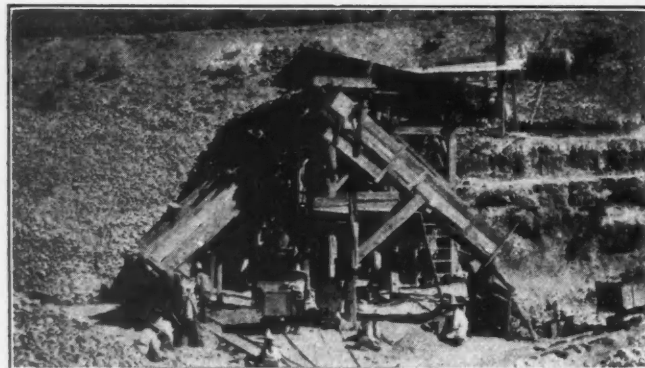
GENERAL VIEW OF CABRESTANTE PATIO



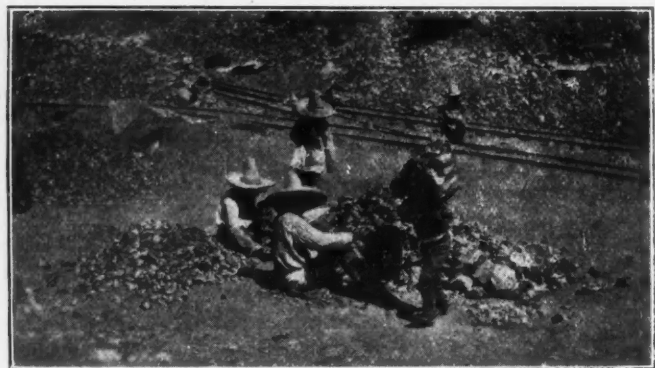
SORTING GRANZA IN FOREGROUND AND GRUESO IN BACKGROUND, CABRESTANTE PATIO



SORTING GRANZA AND SCREENING TIERRAS. BOYS AID IN THIS WORK. CABRESTANTE PATIO



CRUSHING PLANT, HIDALGO PATIO



SORTING GRUESO, CABRESTANTE PATIO

mostly oxidized ore, carrying chiefly silver and lead, together with some gold and a small percentage of copper, but through some of the oxidized ore are scattered occasional patches of sulphide. In order to prepare this ore for shipment to the smelter it is necessary to hand-sort and also to hand-jig some of the ore. This hand-jigging and sorting is done on contract, and part of the ore is even mined

tract of ground or *patio*, and seems averse to tables or other devices. In truth a *patio* has many advantages when using Mexican labor, for such labor to be rendered efficient must be worked on contract. To render sorting on contract efficient the work of the different individuals must be kept separate and be easily subject to close inspection. This is easily done on a flat *patio*, but when tables, bins,

form of picking table can be used to advantage.

SORTING AT THE HIDALGO PATIO

Some ore as has been said is hand-sorted and hand-jigged, while ore containing much copper is only hand-sorted. At the Hidalgo *patio*, the ore to be hand-jigged is dumped over a double series of screens, one having a 1-in. and the other

a $\frac{1}{2}$ -in. aperture. The oversize from the 1-in. is called *grueso*, the oversize from the $\frac{1}{2}$ -in., *granza*, and the undersize from the $\frac{1}{2}$ -in. screen *tierra*. These names are in general use throughout Mexico in speaking of the coarse, medium and fine sizes of ore. The ore sorters are called *pepeneros*.

The *grueso* is roughly hand-sorted into rich ore, second-class, and waste. The second-class ore is packed up to the crusher and, after passing through this crusher, joins the *granza* from the first set of screens and falls upon a $\frac{1}{4}$ -in. screen, the undersize from which falls to the receiving bin below. The oversize from the $\frac{1}{4}$ -in. screen goes to rolls, which crush it to $\frac{1}{4}$ -in. size, and this together with the original *tierra* from the first screens goes to the receiving bin, whence the ore is trammed in cars to the hand

When cleaning the hutch the product is stirred up with water so as to get into suspension the lighter slime which is low-grade. This water used in cleaning the *lama* is then run over a stationary, inclined, riffled table, and thus considerable slime containing chiefly gold and lead is saved.

The company crushes the ore, but the hand jiggling is done on contract, it being necessary to re-treat the concentrates if the jiggling is not well done. The price paid for the *lamas* is 2.50 pesos per ton, while for the *granza* concentrates 4 pesos per ton is paid, so that the Mexicans working on the hand jigs make from 1.50 to 2 pesos per day.

SORTING ORE AT THE CABRESTANTE PATIO

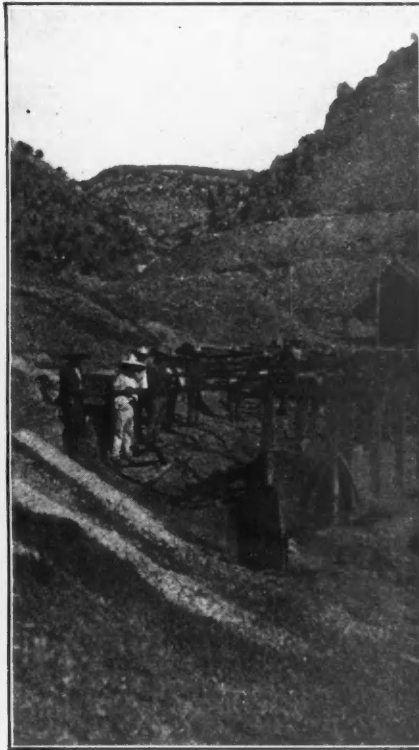
The Cabrestante ore carries quite a little copper in the form of a carbonate or of

screening through a $\frac{3}{8}$ -in. screen. The *grueso* is broken with single jacks to a size ranging from 2 to 4 in. according to the size necessary to obtain clean ore. The small pieces are held with the hand on a stone, but a large piece of ore is held between the sandaled feet of the sorter so as to prevent the fragments from flying when he hits it a double-hand blow with the single jack. The waste is thrown to one side behind the sorter, while the ore is piled on the other side.

The *granza*, ranging in size from about $1\frac{1}{2}$ to $\frac{3}{8}$ in. is hand picked, but in this case the waste is sorted out and the ore is left in the pile. During the sorting the *granzas* are spread out in a thin pile and turned over with a piece of iron held in the hand, thus exposing the different pieces of ore throughout the bed as the sorter works from one end of the pile to



BREAKING GRUESO



HAND JIGS, HIDALGO PATIO



SORTING A DUMP, CABRESTANTE

jigs. These are square boxes having flat bottoms, in which a box having an 8- or 10-mesh screen on it is jiggled up and down by means of a sweep 12 ft. long. A hutch product, called *lama*, and a screen product, called *granza*, are made. While apparently crude affairs, it is remarkable the efficient work that these Mexicans do with these hand jigs on this oxidized silver-lead ore, in which the lead occurs mainly as cerussite and the gangue is mainly quartz. It has been found by tests that a better saving can be obtained with these hand jigs than with a Harz jig. Although about a 4 to 1 concentration is made, the tailing from an ore assaying about 10 per cent. lead often assays as low as 2 per cent. lead; unfortunately the saving on the gold in the ore is not so high.

cuprite, the red oxide; on account of this high copper content it cannot be hand-jiggled like the ore from the Central mine which carries little copper, but is only sorted by hand in order to prepare it for shipment to the smelter at San Luis Potosi. At this property both the mining and the sorting are done on contract. In some cases individual Mexicans take a contract and hire their workmen, while in other cases several Mexicans band together to take a contract. In that case they alternately mine and sort the ore.

The ore from the mine is trammed to the *patio*, where it is divided into three sizes—the *grueso*, about $1\frac{1}{2}$ - or 2-in. size; the *granza*, from about 2 in. to $\frac{3}{8}$ in.; and the *tierra*, below $\frac{3}{8}$ in. The *grueso* is separated by picking it out from the pile, but the other two sizes are separated by

the other. As much of the cerussite goes into the fines, the *tierra* passing through the $\frac{3}{8}$ -in. screen is sufficiently rich to ship. Old dumps are also being picked over on contract, but with dump ore only two sizes are made, *grueso* and *granza*, for little *tierra* is obtained except near the bottom of the dumps.

The waste from the *granza* is picked into *botes*, which, in this case, were old coal-oil cans, and as these were light they served admirably; at some mines baskets are used for this work. The ore is measured by *bote*, the average weight of which is obtained by weighing four or five selected *botes*. It is surprising how the first-class ore is likely to accumulate in the "average" *botes*, for the Mexican, who cannot get ahead of the *gringo* by loafing while working on contract, tries to outwit

him. Consequently the *botes* which are selected for weighing must be closely inspected. Before accepting the sorted ore it is also necessary to have the ore sorter "open" the pile so as to guard against poor sorting. In short, whether working on contract or on day's pay, the Mexican requires close watching. As has been said, the ore is mined and sorted on contract; the price paid is 3 pesos per ton for *tierras* and 7 pesos for *granza* and *grueso*. For ore sorted from the *resagas* (waste dumps) 6 pesos per ton is paid.

The Mexican is pre-eminently good at sorting ore. The number of small boys, some only 7 or 8 years old, that can be seen in the accompanying illustrations, show the reason, for the Mexican begins when a boy to sort ore and when too old to work in a mine he still can sort ore. The rapidity with which a Mexican on contract can sort ore ranging from 1½ to ¾-in. size is surprising and, when one considers the coarseness at which ore sorting becomes uneconomical in other countries, he wonders whether finer sorting is not possible elsewhere.

In conclusion I wish to thank the Montezuma Lead Company for its kindness in allowing me to publish these prices and especially A. M. Tweedy, who, owing to accident to my own films, kindly took other pictures for me.

Mineral Production of the Philippine Islands

The following statement of the mineral production of the Philippine islands in 1907 has been compiled by Warren D. Smith, chief of the Division of Geology and Mines in the Bureau of Science. It is the first time such a compilation has been made. The figures presented are as follows:

MINERAL PRODUCTION OF THE PHILIPPINES, 1907.

Province:	Gold, Oz.	Silver, Oz.	Iron, Tons.	Coal, Sh. Tns.
Albay.....	.....	.....	.....	4,545
Ambos Camarines.....	100	7	.....	.....
Benguet.....	3,888	.....	436	.....
Bulacan.....	.....	.....	.....	.....
Sorsogon (Masbate).....	552	76	.....	.....
Total.....	4,540	83	436	4,545

The comments on the production are as follows: "For the first year this is as accurate a statement as can be made. We hope to include figures next year regarding a number of products such as guano, brick and tile, lime, etc. The scattered condition of these industries, largely native, makes it difficult to secure the information with any accuracy.

"Of the 4540 oz. gold which from actual figures and estimates make up the total, 2540 represent the amount taken out by Americans and New Zealanders; the remainder represents the quantity mined by hundreds of Igorots and sold in Baguio. The average fineness of the gold taken

out by the American and New Zealand operators was 0.850. Some of the Igorot gold recovered as nuggets and stringers would doubtless be finer, but a certain proportion of their gold has been found to be alloyed with copper to such an extent that an ounce would not be worth over \$10. It is to be regretted that our figures cannot be more definite, but this is our first attempt at compiling statistics in the Philippines.

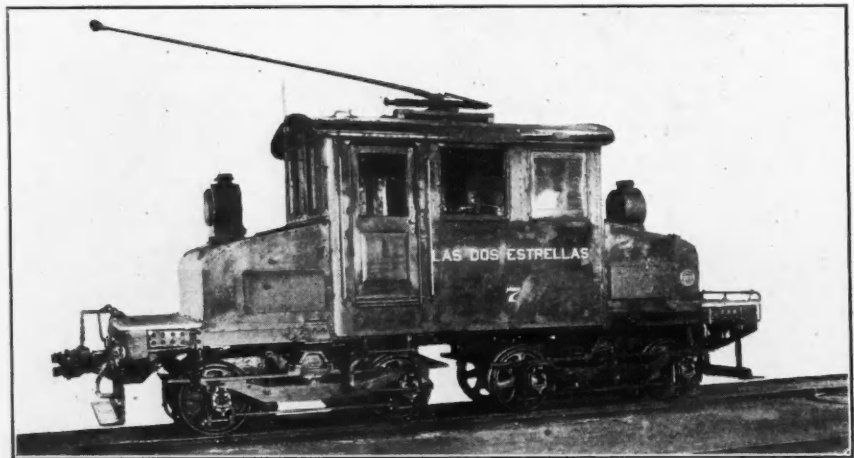
"When it is remembered that the Igorots use no machinery and all the other gold excepting that which came from one dredge set up last May has come from two stamp mills of three and 10 stamps, respectively, which latter have been set up hardly more than a year, and when it is recalled that all the properties are as yet doing little more than development work, the outlook is encouraging.

"Silver is as yet practically a negligible quantity. All the iron produced comes from one furnace, owned and operated by

Electric Locomotive for the Dos Estrellas Mines

The accompanying illustration shows a Baldwin-Westinghouse locomotive for surface haulage, recently built for the Compañía Minera Las Dos Estrellas, of Mexico. This locomotive is of the double-truck type, designed for a track gage of 3 ft., and weighing approximately 60,000 lb. The over-all dimensions are: length, 24 ft.; width, 7 ft. 7 in.; height to top of cab, 10 ft. 11 in.

The trucks are placed 11 ft. 6 in. between centers, and as each truck has a wheel base of 6 ft. 6 in., the total wheel base of the locomotive is 18 ft. The trucks are of the equalized pedestal type, with outside journals and rigid centers. The wheels are of cast iron with chilled treads. They have a diameter of 30 in., and the journals measure 4¼x8 in. Each axle is driven by one No. 102 A motor suitable



ELECTRIC LOCOMOTIVE FOR SURFACE HAULAGE AT LAS DOS ESTRELLAS MINE

a native, and the methods are of the crudest. The coal industry is still in the first stages, but to judge from the active exploration going on in two districts, next year's figures should show a material increase.

"The Igorots of Lepanto-Bontoc manufacture many domestic articles from the copper which they mine themselves. The amount is extremely variable and almost negligible.

There are at present five stamp mills in the Islands—three in Benguet and two in Masbate. The largest has 10 stamps of 900 lb. each. One dredge is in operation in the Camarines and one temporarily shut down in Masbate.

"Up to June, 1907, a total of 1601 lode claims and 533 placer claims had been filed; of these, one lode claim has been patented, 14 have been surveyed and are now ready for patent, and six placer claims have been surveyed and are also ready for patent. In all, 338 coal claims have been filed up to the present time; of these three have been patented."

for 1500 volts pressure. The motors are inside hung.

The frame is built of steel channels and is fitted with cast-iron bumpers. Steps and automatic couplers are provided at each end of the locomotive. The cab is provided with side doors, and has large windows in the sides, front and back.

The equipment includes hand and automatic air brakes, with shoes on all wheels. The motor-driven air compressor is placed back of the cab, in a ventilated casing. The trolley wire is centrally located and the pole is mounted on the cab roof. There are two electric headlights, four cab lights, an air whistle, and four sandboxes, so placed as to sand in front of the wheels when running in either direction.

By crushing in the stamp batteries with coarse screens (200 to 250 holes per sq. in.), heavy stamps and back water service, the mill at the Luipaards Vlei Estate on the Rand is crushing nine tons of "banket" per stamp.

The Goldfield Consolidated 600-ton Mill

The Ore Will Be Crushed by Stamps and Tube Mills, Concentrated on Deister Tables and the Pulp Cyanided in Pachuca Agitation Tanks

BY PERCY E. BARBOUR*

The Goldfield Consolidated Mines Company, under the management of J. H. Mackenzie, has in process of construction a 600-ton mill which will begin treating ore during the latter part of 1908. This mill embodies the very latest practice in gold milling, not only in this country, but also in Mexico, West Australia, and South Africa.

The treatment of Goldfield ores has presented a rather difficult problem both metallurgically and financially; so that when shipped to outside points no ore running less than \$50 per ton could stand the charges imposed. It is expected that this mill now under construction will start up on \$50 ore, and that the grade will soon be reduced to \$30 ore, which is the grade of ore now being treated in the Combination

the foothills at the base of Columbia mountain, on the Sandstorm ground, which was the first mining claim located in the Goldfield camp. The company's mines are about a mile and a half south-east of the mill.

CONCRETE PLANT

On the very top of the hill, at the mill-site, was placed the rock-crushing plant for concrete to be used in the construction of the mill. This plant consists of a No. 3 D Gates gyratory crusher, from which the rock is carried by a steel flight-bucket elevator to a 48x84-in. revolving screen, which runs 21 r.p.m., and is set with a pitch of 1¾ in. per ft. The oversize from this screen goes directly to the bin below, while the material which passes through

The rock and sand is drawn from the bin through standard rack-and-pinion, ore-bin gates into Sterling concrete buggies on the mixing platform, which dump into the hopper of the half-yard No. 2 Ransome concrete mixer. This mixer is driven by a 10-h.p. Bullock motor. Buggies receive the mixture from the mixer and dump into a chute a few feet directly in front, where it falls into a skip car just underneath the platform. This skip, which is one of two on an inclined gravity tram, lowers the concrete to the wall which is being poured. The gravity tram is on the center line of the mill, the shortest wall of which, at the battery terrace, is 210 ft. long, and the longest wall, in the cyanide department, is 294 ft. long. In all there are 12 walls and rows of founda-



SITE AND FOUNDATIONS OF THE GOLDFIELD CONSOLIDATED MILL

mill owned by the same company. Eventually the grade of the ore will be reduced to between \$10 and \$15. When this point is reached, practically everything between walls in the company's mines will be broken down and sent to the mill.

It is expected that the mill will be running by Nov. 1, and that 25 men will be sufficient to put through 600 tons of ore per day at a total estimated cost of \$2.50 per ton.

The design of the mill was carried out by Mr. Mackenzie and his staff. Francis L. Bosqui, metallurgical engineer for the company, is responsible for the cyanide end, and Grant B. Shipley, engineer for the Allis-Chalmers Company, which is furnishing the machinery, is responsible for the design of the mechanical details of the entire plant.

The mill site lies on the west slope of

*Mining engineer, Goldfield, Nevada.

discharges to a set of 26x15-in. style A Allis-Chalmers rolls set directly underneath. The fine product from these rolls goes to a second compartment of the storage bin. This rock-crushing plant is driven by a 75-h.p. Bullock motor.

The rock for the concrete work is quarried from the ledges outcropping nearby, and is largely a silicified rhyolite and a fine-grained granite, both of which are extremely hard and sharp and make excellent rock for the purpose. The product from the crusher will pass a 2¼-in. ring. The fine product from the rolls is used as sand in the mixture.

The screen is without a housing and, as there is always a strong wind on the hill, the fine dust which would otherwise be a serious detriment to the concrete, is blown out and away. The dust flies to such an extent that the men on this job nearly all wear automobile goggles and many wear respirators.

tion piers exclusive of the piers for machinery.

In mixing the concrete a full buggy of rock is dumped into the mixer, then a full buggy of sand, and last, six buckets of water. In a climate so dry as this, considerable water has to be used, and the poured walls are covered with sacks and are kept wet for a couple of days.

CRUSHING PLANT

The ore from the mines will be brought in a train of four 50-ton, hopper-bottom, dump cars and dumped into the bin directly underneath the track. This bin is 9 ft. 10 in. wide, 20 ft. high and 44 ft. 2 in. long; it has an approximate capacity of 850 tons, and is built entirely of timber resting upon concrete foundations. The ore is drawn out through three 30x36-in. standard rack-and-pinion, ore-bin gates on the front side, into three large shaking

being to facilitate dropping the bolts sufficiently to remove a mortar in case one should break. The webs between these apertures are each reinforced with two $\frac{3}{4}$ -in. steel bars, 3 ft. long.

The ore bins behind the batteries are of structural steel and are an integral part of the mill building. They are 18 ft. 8 in. wide, 20 ft. 6 in. deep, and 187 ft. long. They are lined on the bottom, which is flat, with one layer of 4x8-in. timbers on edge and on the sides with one layer of 2x12-in. and one layer of 3x12-in. planks for half the height and two layers of 2x12-in. plank the remaining height. When full, these bins will hold 4000 tons of ore

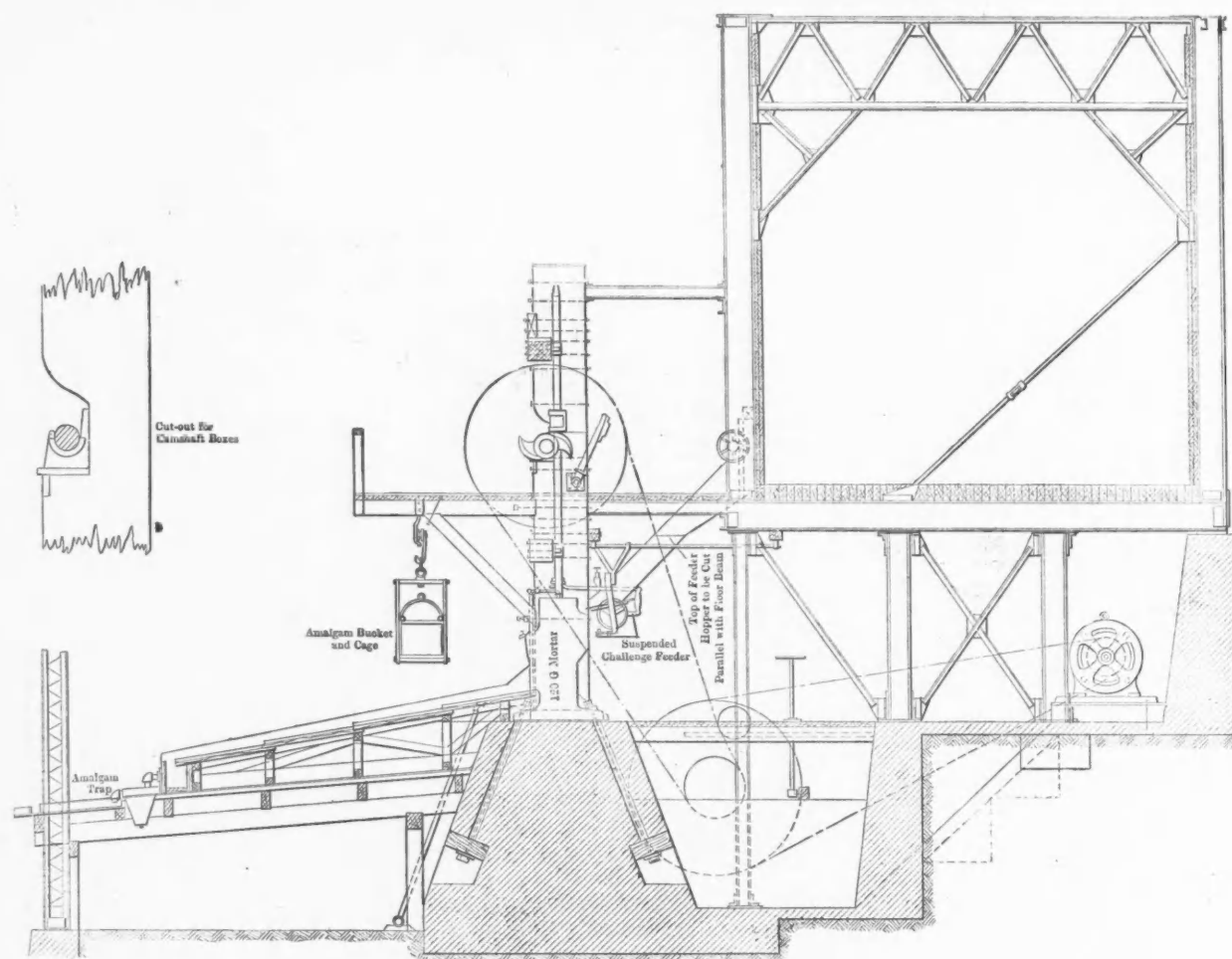
have been made for more than a year. From these results and the experience gained during the entire existence of the Combination mill running on Combination and Mohawk ores, the following process has been evolved.

STAMP BATTERIES

The ore from the battery ore bins feeds through twenty 18x24-in. ore-bin gates into suspended Challenge feeders and thence into No. 120 G mortars. These mortars are of the modified Homestake type, with large opening for quick discharge, and weigh 10,500 lb. each without liners; they are fitted with false bottoms

driving the drive shaft by means of a 13-in. endless double leather belt. The belts from the battery drive shaft to the cam shaft are 16-in. 8-ply Giant rubber belts.

Each mortar, into which is fed six tons of water to each ton of ore, discharges upon a 5x16-ft. copper-plate table sloping $1\frac{7}{8}$ in. per foot. There are four plates per table, each 5x4 ft. x $\frac{1}{8}$ in. thick coated with one ounce of silver per square foot. In front of each plate is a cast-iron amalgam trap. The pulp from these plates goes to twenty 24-in. double-cone hydraulic classifiers, 1.2 gal. of water per minute being added at each of these classifiers. Of the pulp going to these cones,



ARRANGEMENT OF ORE BINS AND STAMP BATTERIES

weighing not to exceed 125 lb. per cubic foot.

The first ores mined in Goldfield were in an oxidized gangue, were free milling, and presented no special difficulty in extraction. The sulphide ores which appear a short distance below the surface, present considerable metallurgical difficulty, and these are the ores which the new mill has been designed to treat. F. L. Bosqui, as metallurgical engineer, and A. G. Kirby, as mill superintendent, have studied the problem in the Combination mill owned and operated by this same company, where detailed and comprehensive mill-run tests

made in halves. The screens are 16-mesh made of No. 21 steel wire. Each stamp weighs 1050 lb. and will make 108 drops per minute. The battery drive shaft is $3\frac{15}{16}$ in. in diameter, and each cam shaft is $6\frac{1}{2}$ in. in diameter and 15 ft. 6 in. long. The drive pulleys are of wood 84 in. in diameter with a 17-in. face; like the cams they are keyed to the shaft by Blanton patent fasteners.

There are 100 stamps in all, arranged in batteries of 10, with five stamps per mortar as usual. Every 20 stamps are driven by a 50-h.p. Bullock motor running 850 r.p.m., placed under the ore bin and

35 per cent. will overflow and will run between 150 and 200 mesh. The balance or 65 per cent., which will run from 16 to 150 mesh, goes to six Dorr classifiers. This spigot product will contain 1.5 tons of water to one ton of dry slime, while the overflow will contain 15 tons of water to one ton of slime.

The Dorr classifiers, or more properly pulp thickeners, are of the improved type with the rocker motion on top and are arranged so that each feeds directly into a tube mill. The classifiers are sheet-steel tanks 16 ft. long by 4 ft. 6 in. wide and 18 to 30 in. deep, set on a slope of 2 in.

per foot. Inside are a series of rakes made of angle iron set transversely, which move back and forth, pushing the pulp toward the top at each stroke and lifting clear of the pulp for the return motion, by means of a cam and rocker arm. The surplus water overflows at the lower edge of the tank. These classifiers will furnish to the tube mills a pulp which contains 46 per cent. moisture. This machine, which is said to be furnishing a product, in several mills, carrying only 25 to 30 percent. moisture, is the invention of J. N. V. Dorr, of the Mogul Mining Company, of Pluma, South Dakota, and is also used in Colorado and Mexico. The overflow from these classifiers goes to the clarifying tanks.

TUBE MILLS AND CONCENTRATORS

The product from the Dorr classifiers drops into a steel hopper and is there picked up by a spiral feed on the trunnion of the tube mill; the pebbles will also be fed by dropping them into this hopper to be picked up and fed automatically by the spiral feed. There are six tube mills of Allis-Chalmers make, 5 ft. in diameter by 22 ft. long, placed three in each end of the building. Each group of three mills is driven by a 150-h.p. Bullock motor running 570 r.p.m. It will require 80 h.p. to start a mill, but only 40 h.p. to keep it in motion. The motor belts are 25-in. endless double-leather belts, and all other belting in the tube-mill department is 3- to 16-in. Giant rubber belt 3- to 6-ply.

The product from the six tube mills will go to six 48-in. double-cone, hydraulic classifiers. Here six gallons of water per minute are added and in addition sufficient overflow from the 24-in. cones to make the 48-in. cones classify properly. The spigot product from these, which will amount to 10 per cent. of the feed, is returned to the Dorr classifiers by four 10x54-in. Frenier sand pumps, running 187 r.p.m., to be returned and reground in the tube mills. The overflow from these 48-in. cones, which will run from 150 to 200 mesh and will contain five tons of water to one ton of dry slime, goes over fourteen 5x16-ft. secondary copper-plate tables sloping 2 in. per foot. Each table has four 5x4-ft. plates coated with two ounces of silver per square foot. Seven of these tables are at each end of the mill and each seven discharge through a large amalgam trap made of 12-in. pipe.

All the overflow from the 48-in. cones, which has passed over the secondary plates, meets the overflow from the 24-in. cones and goes to thirty 8-ft. Callow tanks set next to the wall on the concentrator floor. These tanks are large sheet-steel, conical pulp thickeners and each tank will make 6 to 10 gal. of clear water per minute, which runs off the top and goes to the clarifying tanks below. The spigot product from each Callow goes to two Deister concentrators. There are 70 No.

3 Deister concentrating tables in the mill, 10 of which will treat the middlings from the other 60. These 60 concentrators are arranged in three rows on the concentrator terrace and are driven by three 30-h.p. motors running 850 r.p.m. The power is transmitted to the tables by line shafting equipped with friction-clutch pulleys and friction-clutch cut-off couplings so that the various groups of tables are independent of each other. The table pulleys will run 300 r.p.m. The ten tables for treating the middlings are placed on a platform extending over the first row of settlers in the terrace below, and are driven by an independent 30-h.p. motor like the others.

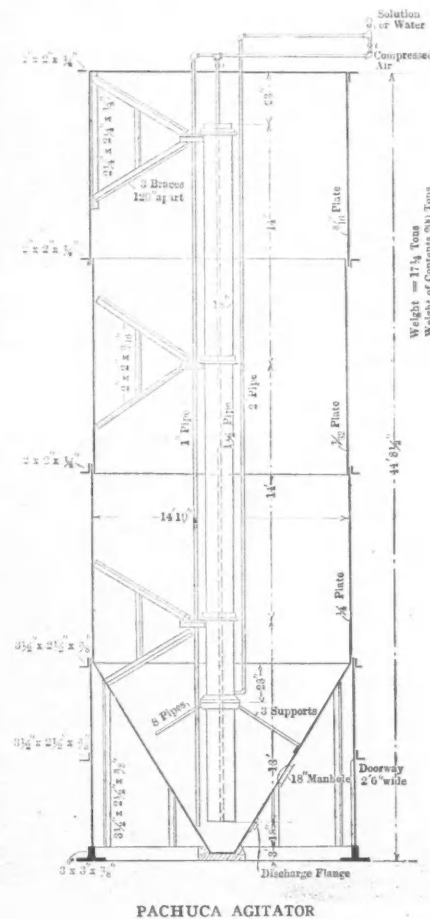
Of the ore which comes to the mill, 3

slimes from the Deister tables flow by gravity into the settlers, which are arranged in sets of four, one set being in process of filling all the time. The filling will require six hours and decanting and discharging will occupy the other 18 hours of the 24. These settlers will give a one to one pulp, one ton of water to one ton of dry slime, which goes partly by gravity and partly by pumps to the Pachuca agitators. The overflow from the settlers passes to two clarifying tanks, 34 ft. in diameter by 10 ft. high with overflow rims and false conical bottoms similar in every way to the settlers. These two tanks are set one 3 ft. below the other in order to get drop for the overflow, and the clear water flows by gravity to the water sump tank. From the sump the water is pumped by 10x12-in. Aldrich triplex direct-gear motor-driven pumps to the mill water supply tanks at the top of the hill. These three tanks have 6-in. discharge nozzles in the bottom, for drawing off the slime which will be returned to the Pachuca tanks to be cyanided.

PACHUCA AGITATORS

There are ten Pachuca agitators each 15 ft. in diameter by 45 ft. high built of sheet steel and supported on concrete foundations. The foundations are octagonal in plan to carry the circular bottom of the tank, with a 3-ft. square pier in the center to carry the small base plate. Cyanide is added to the pulp while in these tanks, and the solution is brought up to the required strength. The pulp in the tanks, which contains about 2½ tons of water to one ton of dry slime, is agitated by compressed air at 22-lb. pressure for 20 hours.

The Pachuca tanks which are adopted from Mexican practice have never been used in this country prior to this installation. They consist of a steel shell made of plate 3/16, 7/32 and ¼ in. thick and have a conical bottom. The lap joints are reinforced with angle iron and each tank is braced with nine triangular braces of angle iron from the center to the sides. In the center of a tank is an 18-in. tube extending from within 18-in. of the bottom to about 23 in. of the top. A 1½-in. pipe for compressed air extends inside the 18-in. tube down from the top of the tank to the bottom where it is open for the air to escape. The air from this pipe rushing up inside the 18-in. tube carries the solution up and over the top into the main tank, in which the level of the solution is kept continually a foot or more below the top of the 18-in. tube. This continuous air circulation provides both agitation and aeration. A one-inch pipe extends down the side of the 18-in. tube to the discharge at the bottom and a 2-in. pipe on the other side of the tube connects with an annular ring from which eight pipes radiate to the sloping sides of the conical bottom. These pipes are flushing pipes to dislodge any pulp which may cake on the



PACHUCA AGITATOR

to 5 per cent. goes out as concentrates; these concentrates will not be shipped to the smelter, but will be treated here by a process now being worked out. This leaves 570 tons of dry slime per day to go to the settling tanks.

CYANIDE DEPARTMENT

There are five terraces in the cyanide department; the first two contain 16 settling tanks 29 ft. 6 in. in diameter and 12 ft. high, with overflow rims and false conical bottoms. These settlers, and all the other tanks in the plant except the agitators, are of redwood and are supported on concrete foundations. The

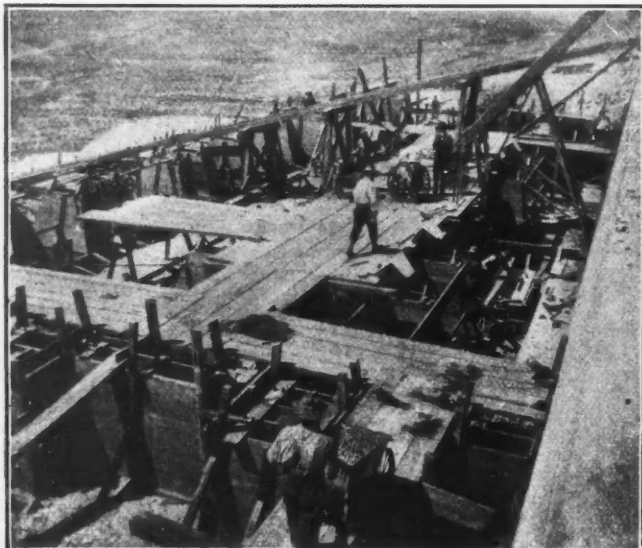
sides or bottom of the tank. Air at 50-lb. pressure may also be used, and the piping is properly arranged for this purpose. When the agitation is completed after 20 hours, the pulp is discharged through a 5-in. pipe at the bottom into an 8-in. main running between the two rows of agitators and thence to 8-in. Morris manganese-steel-lined, belt-driven, centrifugal pumps. Each tank has a 5-in. quick-opening iron gate valve close to the dis-

and supply tanks for the Butters boxes below. These tanks are 34 ft. inside diameter by 15 ft. high and are equipped with mechanical agitators operated by bevel gears from a common shaft driven by a 20-h.p. Bullock motor.

There are two sets of Butters filter boxes each containing six sections of 28 leaves each, a total of 336 leaves. Each leaf is 5x10 feet. A 14x14 Gould vacuum pump with direct-connected motor draws

driven by a 10-h.p. Bullock motor. Between cycles the pulp is pumped back into the pulp storage tanks by two 5-in. manganese-steel-lined, Morris centrifugal pumps, which are set on opposite sides of a single 30-h.p. Bullock motor connected by clutch, cut-off couplings; only one pump will be run at a time.

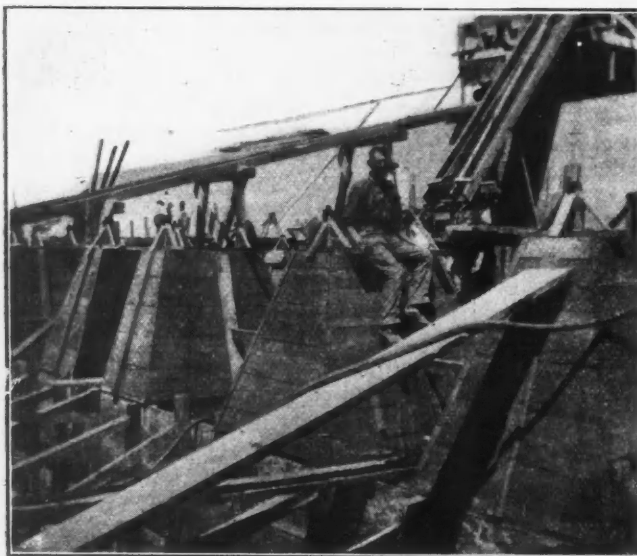
While the surplus pulp is being drawn from the boxes, the vacuum will be maintained at 10 in. in order to hold the cake



POURING TUBE-MILL FOUNDATIONS



FOUNDATIONS FOR PACHUCA AGITATORS



FORMS FOR TUBE-MILL FOUNDATIONS



INSIDE THE FORM FOR CONCRETE-MORTAR BLOCK

charge connection. About $3\frac{1}{2}$ h.p. per agitator is required for furnishing the compressed air. Each tank weighs $17\frac{1}{4}$ tons and when full of pulp about 200 tons. The tanks were manufactured for this installation by the Hammond Iron Works, of Warren, Penn.

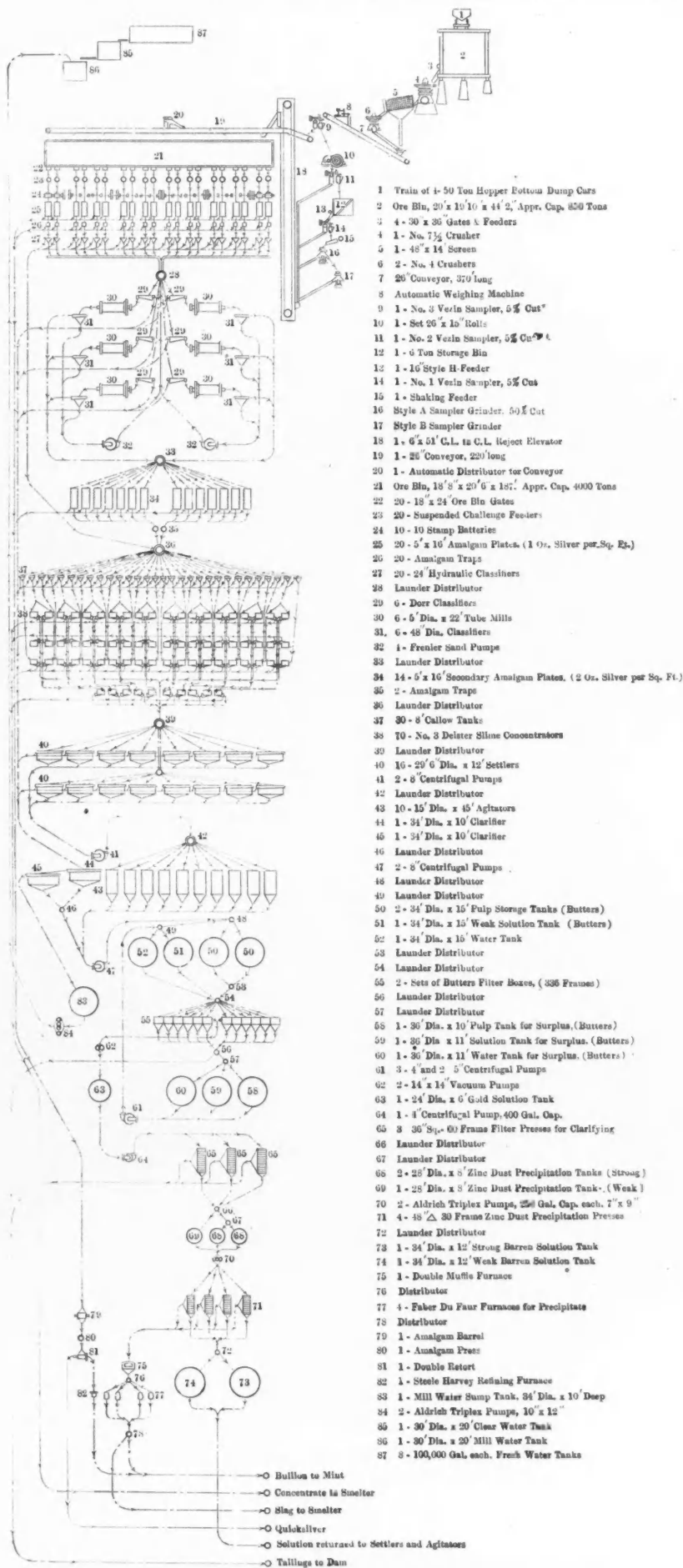
BUTTERS GRAVITY VACUUM FILTER

The pulp from the Pachuca tanks is pumped by two 8-in. Morris centrifugal pumps to two tanks, which act as storage

the gold solution through the filter frames and discharges it into the gold solution tank. A spare vacuum pump, a duplicate of the other, is provided for emergencies. These pumps are each driven by a 15-h.p. Bullock motor.

When a cake $\frac{3}{4}$ in. thick has formed, containing per frame 360 lb. of dry slime, the surplus pulp is drawn off into the surplus pulp tank. This tank is 36 ft. inside diameter by 10 ft. high and is also equipped with a mechanical agitator

on the frame. The filter boxes are then filled with weak solution. The vacuum pump draws this weak solution through the cake and thus washes it, and then discharges the solution into the gold-solution tank. The remainder of the weak solution in the boxes drops by gravity into the surplus weak solution tank which is 36 feet in diameter by 11 ft. deep and between cycles it is pumped back to the solution storage tank by 4-in. Morris centrifugal pumps, each direct-connected with a



FLOW SHEET, GOLDFIELD CONSOLIDATED MILL

20-h.p. Bullock motor. Water from the water storage tank will now be drawn through the cake, and this solution which is practically barren will be pumped into the gold-solution tank. The surplus water in the boxes is drawn off by gravity into the surplus water tank 36 ft. in diameter by 11 ft. high and between cycles this is pumped by one of the 4-ft. centrifugal pumps back into the water storage tank. An extra pump exactly like the other two is provided with by-passes and auxiliary piping to be used in case of accident.

Air or water pressure is now applied on the inside of the leaves in order to break off the cake. This drops into the steel hopper bottoms of the boxes and is discharged into the tailings flume directly underneath, which tunnels under the last terrace of the mill and discharges on the hillside to the tailings dam. These tailings will contain one ton of water to one ton of dry slime.

The leaves are then lifted from the boxes, are washed in the acid wash boxes at the end of the filter boxes and are replaced ready for another charge. The leaves are handled by two crawls running on two 7-in. I-beam tracks overhead. Seven to eight charges per day will be put through the Butters filter. During filtering the pulp is circulated through the boxes by an 8-in. Morris manganese-steel-lined centrifugal pump direct-connected with a 30-h.p. Bullock motor.

CLARIFYING PASSES

The first solution from the acid solution tank is forced by a 4-in. centrifugal pump directly behind the presses, through three 36-in. square 60-frame Perrin clarifying presses which remove all slime. The strong solution then drops by gravity into two precipitation tanks. The weak solution from the Butters boxes to the gold-solution tank is forced by the same pump through these clarifying presses and is drawn back into the weak solution precipitation tank. These three tanks are 28 ft. in diameter by 8 ft. high.

A 12x14-in. duplex Ingersoll compressor in the south end of the terrace will furnish air to two air receivers having a capacity of 250 cu.ft. for the Pachuca agitators and the Butters boxes. The compressor is driven from a countershaft which also drives the two 8-in. centrifugal pumps which handle the pulp to and from the Pachuca tanks. Power for this is furnished by a 75-h.p. motor.

The south end of this terrace next to the motor and compressor is divided into two rooms, one for a boiler room for heating the mill in winter and the other for a cyanide office.

REFINERY

The clarified rich solutions from the tanks are pumped by two 7x9-in. direct-gear motor-driven, Aldrich triplex pumps to filter presses in the refinery, situated on the hill at the south end of the mill. As the solution is drawn from the solution

precipitation tanks, zinc dust is fed automatically and continuously from two 25-in. zinc-dust cones between the tanks.

The filter presses, of which there are four, each containing thirty 48-in. triangular frames, are of a type devised and used by C. W. Merrill, of Deadwood, S. Dak. When a clean-up from the presses is made, the zinc cake carrying the gold is put in pans and treated in a double muffle furnace where all the moisture is driven off and the material is partially roasted. The solution from the presses goes to two barren solution tanks 34 ft. in diameter by 12 ft. high, just outside the refinery building, one for weak and one for strong solutions, which are returned to the mill, the weak going to the Butters storage tank, and the strong being used for flushing out the settlers or passing directly to the Pachuca tanks.

The roasted material from the muffles is ground in a 24x48-in. revolving barrel together with the necessary fluxes and the fine product resulting is treated in four Faber du Faure furnaces. These furnaces are equipped with oil burners, but can also use coke. The product from these furnaces is bullion and slag, the former ready for the mint and the latter to be sent to the smelters.

Amalgam from the primary and secondary plates is put through an amalgam press and as much quicksilver squeezed out as possible. The amalgam balls from this press are placed in semi-circular trays which are then transferred to a retort furnace where the mercury is retorted and recovered. The bullion from the retorts is refined in a No. 60 Steele-Harvey refining crucible, and the bullion product is ready for the mint. A 24x48-in. clean-up barrel is provided to grind the foul amalgam carrying sand, sulphides, etc., from the traps and mortars, and this ground product is then retorted and refined.

The retort and muffle furnaces are built together and will require for construction 9000 red brick, 3000 firebrick and 2000 lb. of fireclay. The red brick will be set in mortar. This compound furnace is equipped for burning crude oil, but is so arranged that it can also burn coke in case of need.

I-beam trolley tracks and crawls are provided in front of the Faber du Faure furnaces, and the muffle furnaces for handling crucibles, pans, and heavy material. A reinforced concrete vault is provided in the refinery for storing bullion and other valuable material. A 10-h.p. Bullock motor will furnish all the power required. The refinery will have two stacks, one for the Faber du Faure furnaces 24 in. in diameter and 60 ft. high and one for the retort and muffle furnace 20 in. in diameter and 30 ft. high.

POWER

All the motors in the plant will be three-phase, 440-volt, 60-cycle machines, and will receive current from the transformer

house on the hill behind the mill building where three Bullock transformers step down a 6600-volt current derived from the long-distance line of the California & Nevada Power Company at Bishop, Cal., 150 miles away. There will be 1305 h.p. of motors in the plant as follows:

	Number.	Horse-power.
Crusher plant	1	150
Sampling mill	1	75
Horizontal belt conveyor	1	15
Stamp batteries	5	50
Tube mills	2	150
Concentrators	4	30
Compressor and belted pumps	1	75
Butters tank agitators	(1)	(10)
	(1)	(20)
Direct-connected Pumps.		
Morris centrifugal pump	1	30
Morris centrifugal pump	3	20
Morris centrifugal pump	1	20
Gould vacuum pump	2	15
Aldrich triplex pump	2	15
Aldrich triplex pump	2	40
Refinery	1	10
Shop	1	10
Tramway	1	20
Total		1305

WATER

The water supply is obtained from the Goldfield Water Company's mains and is a pure spring water brought from Lida 38 miles to the south. From the water company's mains to the reservoir a 5-in. wire-bound redwood pipe is used. The reservoir is situated on the westerly side of Columbia mountain about $\frac{1}{4}$ mile from the mill site, at a slightly greater elevation, and consists of eight 30x20-ft. redwood tanks having a total capacity of 800,000 gal. The water from the reservoir flows to a clear-water tank of the same dimensions on the mill-site hill, and thence to a mill-water tank of the same dimensions just below the former tank, and just above the battery ore bin. From this tank the water flows to the main in the mill.

An incline tramway, 30-in. gauge, operated by a 20-h.p. motor will reach from the lowest level of the mill to the top of the hill for handling supplies and material. The motor will be placed in a small addition to the shop building just south of the refinery. A 10-h.p. motor will run the shop, which is a small one, and intended only for small repairs, as the company has an extensive machine-shop equipment at the mines.

To Test Protective Paints for Iron Surfaces

The Paint Manufacturers Association has undertaken a series of experiments to test the protective properties of various pigments when applied in oil to iron and steel surfaces. Experiments by Alliston S. Cushman, of the U. S. Agricultural Department, have proved the electrolytic theory of corrosion and showed that bichromates of the alkaline earth metals when in solution offer a perfect protection for iron surfaces. Chrome pigments did not, however, give positive results when

placed in contact with iron surfaces, some even serving as "rust stimulants."

The tests inaugurated by the association will determine by practical application which pigments are actually protective and which are destructive when applied to iron surfaces. The place selected for the test is Atlantic City, N. J., where a fence 300 ft. long will be erected. The fence will have accommodation for 300 steel plates which will rest upon girders 24 in. from the ground. The plates are to be rolled from three classes of metal, bessemer low-carbon steel, open-hearth structural steel and pure ingot iron. The plates are to be 24 in. wide and 36 in. high, approximately $\frac{1}{8}$ in. thick. Four plates of each metal are to be used for each paint formula. Two of these plates are to be painted in the condition as received after previously scratch-brushing the surface, thus following out the ordinary methods of painting structural iron. The balance of the plates are to be pickled in sulphuric acid in order to completely remove the scale, subsequently neutralizing the sulphuric acid with lime. The plates are to be painted under cover so as to secure equal conditions. A uniform spreading rate is to be used and a series of unpainted plates will be placed upon the fence with the painted plates so that the rapidity of corrosion of the various metals may be watched. At proper times the various committees will make inspection of the fence to note the wearing qualities of the different formulas.

Railroad Patents to Mineral Land

SPECIAL CORRESPONDENCE

A hearing of considerable importance to California miners has been before the Sacramento land office recently. The matter in question is that of Claus Erich and others against the Central Pacific Railway Company and involves a dispute over about 80 acres of mineral land known as the Spanish Dry Diggings, near Georgetown, El Dorado county. Erich, with 18 others, are protesting the claim of the railroad—virtually the Southern Pacific—to the property. Not long after the Government issued a patent for the land to the Central Pacific Railway Company, Erich and others located claims on it, claiming that it was mineral in character and that the railroad company had deceived the Government as to its character, thus violating the law. This the company denies and refuses to surrender the land. The hearing is to ascertain whether or not the patent to the railroad company should be cancelled. After the testimony is gone over by the Federal officials, if it is determined that the Central Pacific was guilty of fraud, the case will be taken to the United States courts to throw the land open to entry.

Coal Mining in Southern Anthracite Field

Methods in Use Where Seams Are Gaseous, Unusually Warm, Lie at Every Pitch, and Bottom Has Been Known to Heave 1 ft. in 10 Hours

BY THOMAS F. DOWNING*

It is often asked, "What is the difference between the Northern and Southern anthracite coalfields of Pennsylvania?" Why is it that a miner considered competent and skilful in the Northern basin finds himself embarrassed by new conditions in the Southern field? Is not the coal practically of the same quality? Are not the same general mining problems to be met with in both sections? It is in answer to these questions that I have prepared this article.

For the benefit of those unfamiliar with the anthracite coalfields of Pennsylvania, it may be said that they extend, roughly speaking, from the western extremity of Wayne county in a southwest direction,

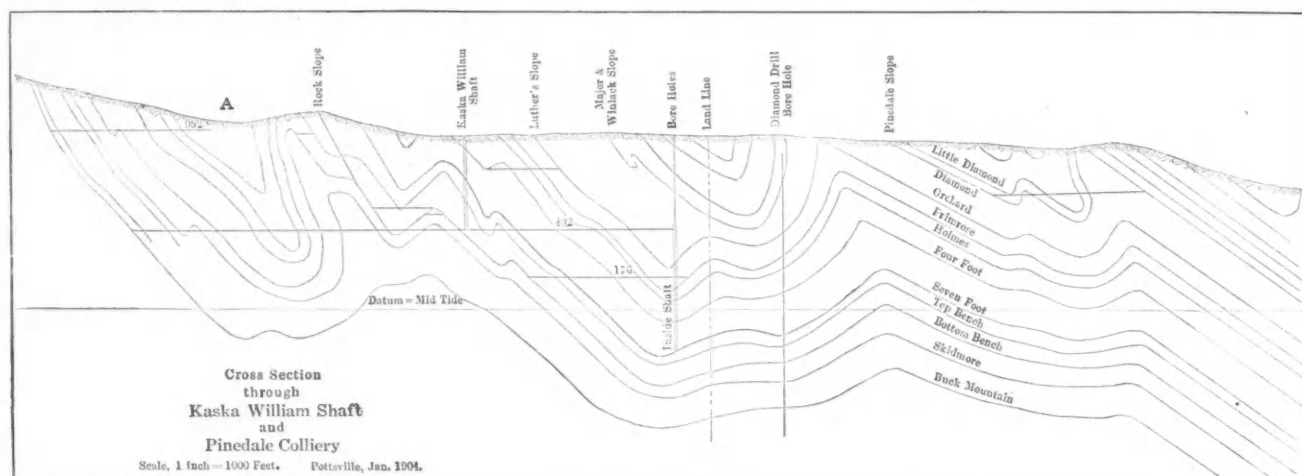
of the Broad mountain, so well known to all mining men of the last two divisions. This is what is meant in this part of the great anthracite coalfields, as the tracts lying above or north of the mountain, and below or south of the mountain.

CROSS-SECTION OF THE MEASURES

As we descend from the most northerly region to the more southerly ones, we find that the comparative flatness and symmetry of the coal seams gradually develop in complexity until we reach a climax of irregularity in the Pottsville basin; it is here shown that different geologic conditions existed in these two regions. I do not intend to assert that there are no

developments with a pick and shovel have shown the seams to lie in a different position. Understand that the utmost skill and care available were employed in making this cross-section, nevertheless, when the beds were opened, discrepancies were found. In many instances, miniature saddles and basins have been discovered, not expected nor thought of when making the section.

The section shown in the accompanying illustration was made on the line of the shaft. If two other sections were made of this same colliery, one east and the other west, the seams would be seen to lie in a totally different position. Observe in the northern basin there are no north dips,



TYPICAL SECTION THROUGH COAL MEASURES IN SOUTHERN ANTHRACITE FIELD

to the eastern part of Perry county. They are bounded on the north by the Wyoming and Shickshinny mountains, on the south by the Orwigsburg valley, on the east by the Moosic mountains and the headwaters of the Lehigh river, and on the west by the Susquehanna river; the territory therefore comprises about 1680 square miles. This is by no means all coal territory. In fact the coal-bearing lands are estimated at about 300 square miles, increasing from year to year as more seams are discovered.

Naturally, so large a section of land is split up into various basins more or less independent of one another. For purposes of greater clearness, we may collect these basins into four districts, viz.: The Northern Wyoming and Lackawanna field; the Upper Lehigh; the Mahanoy and Shamokin and the Southern or Pottsville field. The section which is now under consideration is that lying immediately north and south

sharp pitches or irregularities in the northern fields, but the great difference lies in the extreme intricacy of the lower basins and the simplicity of the northern ones.

I will assume that the Buck mountain is the lowest bed worked, although it is well known that the Lykens measures are below and have not yet been worked in this section.

Following are the various seams, starting from the Buck mountain as the lowest; Seven Foot, Skidmore, Bottom Split, Middle Split and Top Split of the great Mammoth bed, the Four Foot, showing in places, Holmes, Primrose, the Orchards, the Diamonds and the Traceys. There are several seams above the Traceys, but they are not found in the section under consideration.

Let me illustrate by a cross-section of the Kaska William colliery situated about 8 miles west of Tamaqua. This section was made in January, 1904, yet subsequent

the beds being inverted. The same thing occurs in the southern basin.

THE ST. CLAIR SECTION

The Pottsville shaft is sunk to a depth of 1600 ft. and is bottomed only on the Primrose seam. If it had been sunk to the Bottom Split of the Mammoth seam, its depth would have been possibly 2,000 ft. Yet this is not the deepest part of the basin. If a shaft were sunk farther south or in the basin itself, its depth would possibly be over 3,000 ft. to the lowest bed. Farther south we approach the Sharp mountain where we find the seams standing on end; in fact, more than perpendicular, as they are inverted. Much could be written on the seams, conditions, etc. of the Sharp mountain, but the field is too large for a short article and I will consider the St. Clair section or that portion extending from Beechwood colliery to Kaska William colliery.

Beechwood colliery, located about 2½

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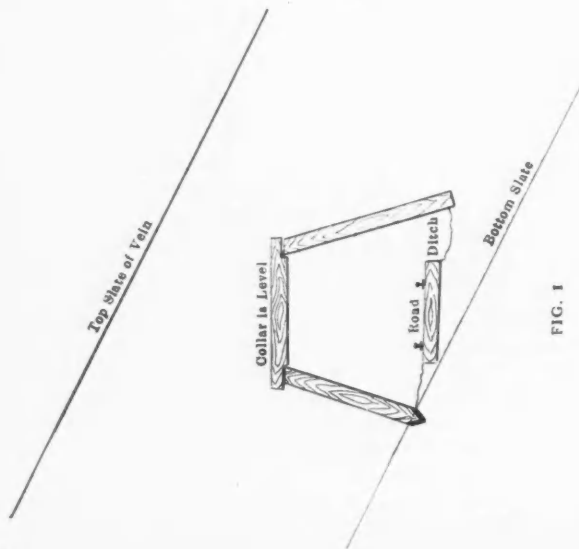


FIG. 1

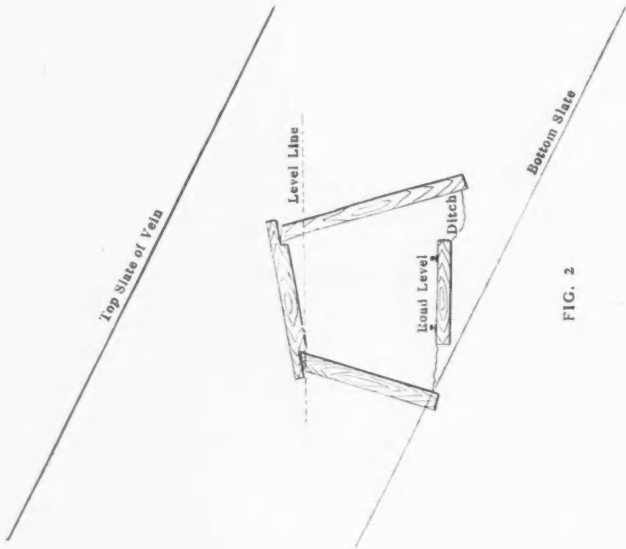
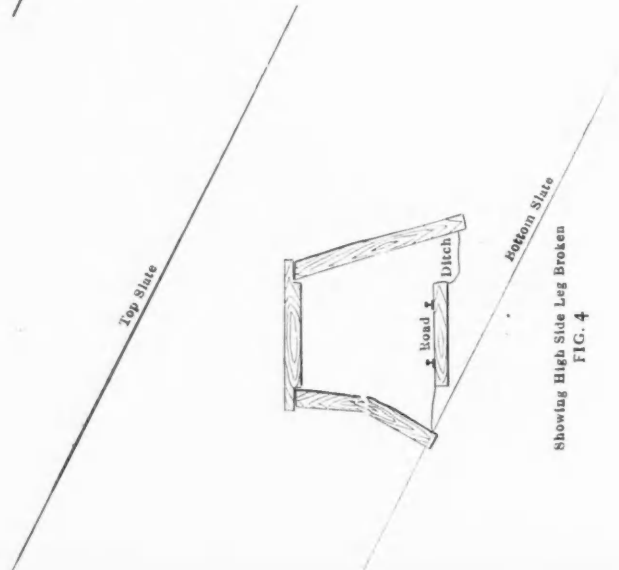


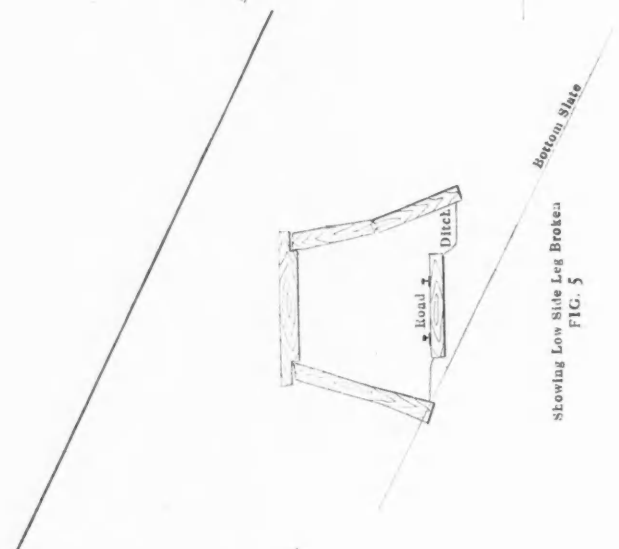
FIG. 2



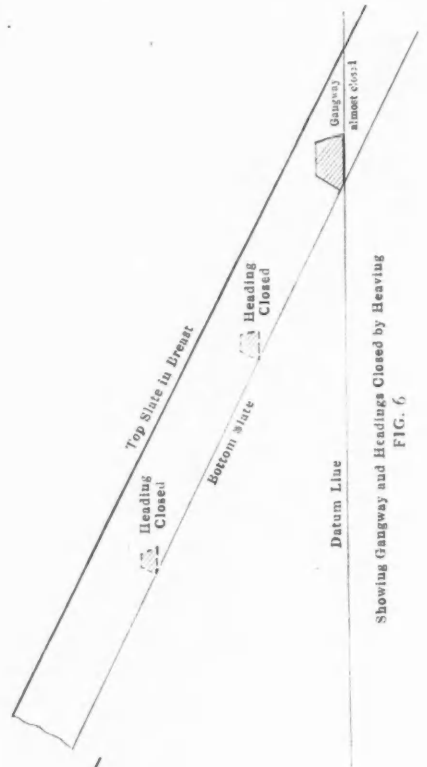
FIG. 3



Showing High Side Leg Broken
FIG. 4



Showing Low Side Leg Broken
FIG. 5



Showing Gaugway and Headings Closed by Heaving
FIG. 6

miles north of Pottsville was abandoned about 13 years ago. Wadesville colliery is now working this territory and the breasts from these gangways are now holding into the old Beechwood workings, from the plane-level workings. The seams worked are the Buck mountain, Seven Foot, Skidmore, Top Split, Bottom Split, Holmes, Primrose, Big and Little Orchards, and Big and Little Diamonds. Why was Beechwood colliery abandoned? They had the Top Split seam from 7 ft. to 16 ft. thick, and the Bottom Split was from 8 to 20 ft. thick.

Better or cleaner coal was never taken out of the earth. Imagine a colliery with seams of the above thickness, and averaging 15 ft., which must be abandoned because they were not profitable. Yet in the Upper Lehigh region, seams from 2 to 3 ft. thick are worked. Why is this? Allow me to present some of the difficulties we have to contend with.

DIFFICULTIES MET WITH

I will first speak of the Top Split or upper member of the Mammoth seam. In this bed, the pitch is from 15 to 30 deg. and the seam gives off a great quantity of gas. The difficulty of working this coal is augmented by the bottom member of the Mammoth, which is separated from the Top Split by a layer of slate from 4 to 7 ft. thick. We drive the gangway on the bottom slate with a 7 ft. collar, 12 ft. spread, and a height from 7½ to 8 feet. A stump heading is driven parallel to the gangway, 36 ft. up the pitch. Chutes are driven with 50 ft. centers. From these chutes, breasts are opened and are driven up from 6 to 8 yd. wide when the top will permit. Two manways are used, juggled and coupled, and having the gob carried in the center. It often happens after driving the breast for a distance of 20 to 30 ft. that the work must stand idle on account of the great volume of gas arising from the bottom. The face may be entirely free from gas because of the air passing through, about 15 to 20,000 cu. ft. per minute. The gas becomes diluted with air and passes away, but the safety lamp cannot be carried within 3 ft. of the bottom, as it is filled and quenched, so great is the outpour of gas from the bottom slate. After two or three days, this gas drains off and the work may then proceed for another 20 ft. more or less, when like conditions again compel a cessation of operations.

PLACING MINE TIMBERS

Sometimes chutes are driven to the required distance with a 7 ft. collar and an 8 ft. leg; the coal is then mined from the top and sides until the opening reaches the required width, the work beginning at the face, and the miners retreating as the top rock falls, until a distance of about 50 ft. from the stump heading is reached. This coal is left to support the stump heading and gangway.

The gangway, as already stated, is driven on the bottom slate as represented in Fig. 1. It will be noticed that the high side leg is butted or sharpened to almost a pencil point; if the leg was placed, as shown on the low side, the stick would be broken, probably in less than a day, as shown in Fig. 4, due to the pressure from the bottom slate. The high side leg being pointed, offers a minimum of resistance to the heaving bottom slate, which rises around it and breaks, leaving in numerous instances cracks as large as a man's leg. This disturbance throws up the rail perhaps 6 in. on the high side, so that in a few days the mine wagons strike the timber on the low side.

Frequently, 50 ft. of gangway is driven and the work must stop on account of the heaving of the road and the breaking of the timber. The men must then return and lower the road and retimber the gangway to the face. They then drive possibly another 50 ft. and come back and lower the road again. More than 60 names may be seen on the pay rolls, of men employed in lowering roads, and this number is augmented every idle day, Sunday included. Many of these men are employed at night, cutting down the roads; they work on until near the morning quitting time, then connect the new road with the old one, so that the work may go on next day.

At the point where the two roads are connected, the men block up the connection on an incline, and a runner accompanies the driver of the day's trips, and puts sprags in the wheels of the last two or three wagons to keep the trip stretched while going down the incline; the object being to prevent the mine cars from bumping and injuring the unfinished road. With precaution, the roadbed remains comparatively firm and the work proceeds night by night. It often happens, however, that before the first gang of men has reached the face of the gangway, a second gang is obliged to follow them up to cut down still lower, the gangway which has already been lowered.

HEAVING OF THE BOTTOM

The question naturally arises, "When does this heaving cease?" It does not cease at all. The force of the gases in these measures is so great, that foot after foot of roadbed is removed until the slate is entirely gone, and the coal of the Bottom Split itself is reached. Then, although the heaving still continues, the conditions become more manageable, owing to the diminished force of the gas.

What follows may seem incredible, but nevertheless is true, as I know from actual observations. In the Beechwood colliery, one section of the gangway heaved 1 ft. in ten hours, and on the turnout of the west third level of the same colliery, where the slate was from 4 to 5 ft. thick between the Top and Bottom Split, in four years it had all been removed and the

center of the turnout was lowered to the bottom slate of the Bottom Split, so that in less than 4 years the strata had lifted a distance of 20 ft. in the center of the turnout.

It is by no means an unusual occurrence that the driver brings out his first trip in the morning, and returning with the second, finds that during the brief space of time which elapsed while loading this second trip, the roadbed has suddenly heaved so that the wagons strike the timbers and either knock them down or they themselves become so jammed that it is necessary to mine under them to relieve the trip.

MINING THE BOTTOM SPLIT OF THE MAMMOTH

The above concerns chiefly the Top Split. Now, as to the Bottom Split gangway of the Mammoth. It has always been said that the slate between these two sections or splits ranges from 4 to 7 ft. in thickness. We drive crosscuts from the Top Split to the Bottom Split gangway at about 500 ft. intervals, and we find the same difficulties here as before, viz: heaving of the bottom and sides with additional enormous pressure from above. We try to get this crosscut, when driving, under a Top Split breast to turn our curve in, because in driving our Bottom Split gangway, the moment it gets under a pillar of the Top Split, we are aware of the fact by a new kind of difficulty that we have to contend with; namely, additional pressure, which we meet by what is known as forepoling.

FOREPOLING

Forepoles are oak timbers from 4 in. to 7 in. in diameter, and from 12 to 14 ft. long; the small end of the pole is sharpened to a point to facilitate driving. We start to take out a portion of the coal at the height of the last collar, then insert poles on the top of the same collar and drive them ahead for about 6 ft. After the poles are in place, if they do not touch each other, inch boards are used to stop up all spaces between them. The miner calls this process forepoling and shingling. The top being now secure, we start on the high side and pole behind the leg, cutting the coal for a space about 2 ft. wide; a pole is then driven in the bottom slate and is spragged and lashed to the last set standing. We then start on the low side and forepole again, before cutting another opening 2 ft. wide to get in the low side leg. We are now ready to put on the collar, and it will be noticed that we have not removed any coal excepting that necessary to stand the legs and collar; the main body is left until the timbers are in place to hold the face. Even with these precautions, it often happens that the coal in the face will start to burst out. It is then necessary to get planks and sprag the face before we can put on the collar.

I have often seen more than 500 cu. ft. of loose coal force itself through a hole not larger than a man's hand before we were able to control it. Miners who are not familiar with these conditions may think this statement incredible. They will also say that a lump of coal ought to close so small an orifice. The pressure from the sides and top has powdered this coal until you would not be able to pick up a piece from the heap discharged much larger than a walnut. Fortunately there is a band of slate in this Bottom Split and after this force has diminished, either a lump of coal splits it up, or a band of slate serves the same purpose. It usually takes three shifts' work to stand a set of timber and I have known three days to be consumed in doing it. All this coal has been taken out without firing one shot. This repeats itself until the Top Split pillar is passed, then crossing the next breast we are able, with a few poles on top and sides, to get up the next set on.

After these timbers are stood, our troubles are not yet over, because the pressure still remains. We stand our timber as represented in Fig. 2. The collar is not stood horizontally, but is about 6 in. higher on the low side. In a few days the set looks as in Fig. 1, after a few more days, as in Fig. 3, if not broken. I have often seen a set of timber stood at night and found it split and broken in the morning. The timber in use in this gangway ranges from 14 in. to 20 in. in diameter.

GENERAL SYSTEM OF WORKING

We drive chutes here every 50 ft. as in the Top Split, and also a stump heading 36 ft. up the pitch parallel with the gangway connecting the chutes. This last is driven with a 7-ft. collar and an 8 ft. leg until within 30 ft. of the upper gangway, or until the limit is determined. We then drive this chute on a heavy pitch until we reach the top slate and there open headings from breast to breast to insure the carrying off of the gas. We proceed to rob the chutes back, and at 30 ft. intervals, drive slant chutes from breast to breast to rob out the pillars. We have tried to work this section of coal breast-fashion, say about 6 yd. wide with two manways coupled, but the pillars, despite all our cares, would run, and rock would fall before the breast was half way up. Sometimes even the chutes run away and we have to resort to the old system of forepoling as described above. Pillar headings are driven 50 to 60 ft. apart on the bottom slate with a 4-ft. collar and a 6-ft. leg, and every heading, before it is holed into the next breast, must be lined because of the timber breaking. What is meant by "lining," is to stand sets of timber between the original sets which were 5 ft. apart, to strengthen the opening; these openings are often retimbered four times while driving up the chute and robbing back.

AN ATTEMPT TO SOLVE THE PROBLEM

Mining men will ask whether there is no remedy for this state of affairs. Every miner who has confronted these problems has exercised all the ingenuity at his command to solve them, but up to the present time in vain. One expedient tried was as follows:

The gangway was opened the usual width, then on each side behind the legs, a foot of solid coal was removed, a partition of 2 in. mining plank was used instead of lagging and this foot of space was filled with loose coal to act as a cushion or buffer against the pressure. The plan, however, was a failure because the pressure did not exert itself evenly.

Possibly the pressure would come from the high side, thus forcing the timber to the low side, and 20 ft. away the condition would be reversed, the timbers being forced to the high side, thus throwing them out of line; within one month the gangway had to be closed down and new sets of timber stood, this time with a new collar long enough to cover the excavated additional 2 ft. behind the old legs. Holes have been drilled in both coal and slate in order to allow the gas to escape. This answered very well for an area of about 1 ft. from the hole, but 5 ft. away the old forces were at work. Any miner can see that to drill holes 1 ft. apart each way is simply impossible on account of the expense.

MANY EXPERIMENTS FAILED

It will be noticed from Fig. 3, how the leg on the low side which has been placed without any butting, has been forced through the coal, sometimes a distance of 3 ft. The low side is often forced down so far that the top of an empty wagon with a height of 5 ft. catches the collar. We have tried to overcome this by sinking a deep hole and filling it with hay, straw and manure before inserting the leg. This was a failure. Another experiment that failed was to fill the hole with hard rock. The only thing of benefit, found up to the present time is, when relieving timbers, to dig around the leg, place a chain around it, get a long lever with a short fulcrum and pull it out so that the surrounding coal may not be disturbed. The cavity is then filled with 2-in. plank to within 6 in. of the top of the hole, and the new leg is placed on top of the plank. These pieces of plank being placed at right angles to each other, seem to hold the particles of coal together and form a kind of foundation or pedestal for the leg. This is the most successful expedient thus far tried to keep the legs from sinking as far as before.

Where the top slate is sufficiently strong to permit the coal to be mined in breast fashion, that is, 16 ft. to 20 ft. wide, the headings are driven on the bottom slate as described before, and the last heading against the top slate with a prop on the high side.

The miner from above the mountain may think this heading will stand, being against the top slate, but such is not the case, a gang of men must be constantly removing the bottom coal which continually heaves, in order to keep the required area open for ventilation.

In traveling through these finished breasts, I have frequently tried to find where the old headings were formerly driven; but so enormous has been the shove of coal, and the headings have been so solidly filled, that they furnished little evidence by which they could be located, an apparently solid front of undisturbed coal being seen as shown in Fig. 6.

Again at the Beechwood colliery in the west third level slant, a breast was driven which holed into the gangway above. For some unknown reason, the rails at this point had not been taken up from the old gangway, and they were found pressed into the form of waves, and the gangway itself was closed so tight that it was impossible to crawl through it. This gangway has been abandoned possibly for four or five years. Contrast this with the recent pumping out of a colliery above the mountain where the gangways stood almost intact after having been abandoned for 25 years.

MANY TUNNELS NECESSARY

Another illustration of difficulties and expenses which are constant in this complex southern field lies in the number of tunnels necessary. As is evident from the section submitted, the constant succession of saddles and basins and also their peculiarities of rising and falling in such short distances cause innumerable tunnels to be driven, bringing up the cost of coal.

I have in mind at the present time a colliery that ships 3 times the coal that the Kaska William mine produces, and yet has not driven nearly as many tunnels as the latter. Oftentimes in this field the seam of coal does not lie where expected, and as a consequence the tunnel must be driven 100 ft. or more in unprofitable rock before the bed is reached.

MINES ARE UNUSUALLY WARM

Another novelty to the northern miner visiting our southern field is the extremely high temperature encountered, the heat being generated in the old workings. A stranger passing through one of our mines might believe there was a fire, so great is the heat. I remember one instance among many in which 40,000 cu. ft. of air per min. passed through one section of a mine, and at its exit was 20 deg. higher in temperature than when it entered.

The question will arise in the minds of those who have not worked under these conditions, how air is conducted to the face of the gangway when the presence of such vast quantities of gas is manifested by the breakage of heavy timbers and the upheaval of the strata. When the pitch is

light, the old gangway timbers are used to form a cribbing which is placed against the plank battery as soon as the breast is finished. While building the cribbing, all spaces are filled with silt or fine coal dirt, and since the pressure is exerted on all sides, this silt is packed so close that it forms an air-tight battery. Where the pitch is heavy, a double battery is built in the chute between the stump heading and the gangway, having two center props under the collars. The remainder of the chute from the battery to the stump heading is filled with coal dirt from the old breast.

TIMBERING IS GREATEST EXPENSE

All this expense mentioned above is but small, compared with the enormous expenditures incurred in timbering our mines. There has been such an amount of discussion in the periodicals of the day as to our rapidly diminishing forests that the question of the great consumption of timber in the mines is not new. It is a pleasure to be able to state that W. J. Richards, general manager and second vice-president of the Philadelphia & Reading Coal & Iron Company, is giving to the problem of the preservation of mine timber, his personal attention, and is erecting a large plant where timber is subjected to various tests looking toward a reduction of expense to the miner.

Let the fortunate miner from the Northern fields who mines his coal with an expense of 10c. per ton for timber owing to his reliable top slate, imagine being obliged to mine every foot only by the help of timber, running his expenses for this one item anywhere from 20 to 30, 40, or even 50c. per ton. He will with difficulty understand the necessity for this, since his own mine is so safe with but little timber; however, we operators below the mountain must use greater and greater skill in mining and preparing our coal, in order to overcome this heavy handicap upon our production, so that in the market we may be able to compete with other fields.

Space will not permit a detailed discussion of the methods of preparing our coal; however, a description of the Orchard seam with a dip of 70 deg., which bed we are now working at the Kaska William colliery may be of interest. Following is a section of this seam beginning with the bottom slate:

Coal.....	2ft. 4 in.
Slate.....	0 ft. 10 in.
Coal.....	1 ft. 6 in.
Slate.....	2 ft. 5 in.
Coal.....	1 ft. 0 in.
Dirt.....	0 ft. 5 in.
Falling stone.....	1 ft. 3 in.

This makes a total bed 9 ft. 9 in. thick, of which 4 ft. 11 in. is refuse. All this must be handled in the breaker, so further words to mining men are unnecessary.

In conclusion, a few remarks concerning the above statements may not be out of place. Some of the figures given will be startling to those not conversant with the Southern coalfields and may appear exaggerated.

To such persons, I would say that any questions or doubts will meet with ready consideration if presented, for I have endeavored throughout to under-color and understate the peculiarities mentioned. I will be glad to hear from my fellow-miners on a subject of so much mutual interest.

A Practical Test for Coking Coals*

BY MAX A. PISHEL

While engaged recently in studying the physical properties of coal, especially with reference to the color of the streak and powder, I observed that some coals adhered much more strongly to the mortar while being pulverized than others, and that the best coking coals were the ones which adhered most, while the non-coking coals adhered but slightly, or not at all.

This gave promise of affording a simple and inexpensive method of distinguishing coking from non-coking coals without the necessity of a trial in an improvised rick, or the better but more expensive way of sending the coal to a coking plant for a test in a regulation oven. For a long time, geologists, chemists, and practical coal miners generally have been searching for such a test, but up to the present time without success.

In view of these facts the adherence test seemed to be promising, and I began experimenting systematically with all coals available in the study collection of the United States Geological Survey. Fortunately this collection comprises a large number of samples of all kinds of coal from lignite to anthracite, and includes some of the best known coking coals of the country.

In all 150 samples of coal were tested, and the results seemed to be of sufficient economic importance to warrant publication. I therefore take this opportunity of presenting in brief form a statement of the method of conducting the test, and the results obtained on the samples referred to above. I do not regard my conclusions as final, but merely give the facts for what they are worth, hoping that others will make application of the test and thereby determine its value in a practical way.

The method of conducting the test is as follows: Pulverize in an agate mortar a small quantity of the coal to be tested until it will pass through a 100-mesh sieve. Pour out the pulverized coal and observe the condition of the mortar and pestle. With some coals the mortar and pestle will be deeply covered with a coating of coal dust which adheres so strongly to the agate surface that it is removed with difficulty; with other coals there will be only

a thin film of coal dust adhering to the mortar and pestle; while with still others both mortar and pestle will be nearly as clean after the coal is pulverized as they were before the operation began.

The degree of adhesion seems to coincide with the coking qualities of the coal. If it adheres strongly the coal will probably make excellent coke. If it adheres only slightly the coal possesses the coking qualities to only a slight extent, if at all, and if the mortar shows no coating of dust, the coal is to be regarded as non-coking. The intensity of adhesion is noticeable especially when one tries to clean the mortar, for it requires considerable rubbing to entirely remove the coal.

In addition to the adhesion of the fine particles to the mortar, some coals show a tendency to pack together or cohere. Although this phenomenon appears to be limited to coking coal, it is thought to depend more on the moisture content in the coal than on its coking quality, but sufficient work has not been done to determine this point.

To make the tests satisfactory, the sample should be as carefully prepared as one taken for chemical analysis, and it should be taken in the same manner, i.e., by cutting a channel from roof to floor so as to include all merchantable coal. In sampling for coking tests each bench of coal should be sampled separately, and in case well developed benches do not occur, the bed may be sampled one foot at a time, keeping each sample separate from the others and properly labeled. Each sample should be pulverized so as to pass through a 1/2-in. mesh, and then quartered down to a convenient size for handling and transporting.

Sufficient work has not yet been done to determine the effect of moisture and ash on the adhesion of the coal, but it seems probable that they affect the result, especially when they are present in exceptionally large amounts. Until this is determined, it is better to have the samples in approximately the same conditions as regards their moisture content. If the ash is above 10 per cent., it will probably interfere with the adhesion of the fine coal, and this would indicate a poorer grade of coal than actually exists.

In conclusion, I request every geologist and mining engineer engaged in coal work to apply this test as occasion permits, keeping careful notes of the results, and if it fails or appears to fail, to publish the results. If the test is as successful as now anticipated, it should be used by all persons engaged in coal work, for its extreme simplicity puts it within the reach of all.

One method recently proposed to lessen the dangers from coal dust on roadways in extremely gaseous mines, is to have an 8-hour coal-getting shift, then shot-firing during the next 8 hours, and, after that, an 8-hour repairing shift.

*Abstract of article published in June-July, 1908, issue of *Economic Geology*.

Colliery Notes

Concrete mine props, which are expected partially to replace timber in collieries, are being tested in the Burnside colliery at Shamokin.

Concrete has proved effective when used for heavy piers built at the intersection of gangways as a support to the ends of the steel framing used to support the roof.

Spruce or hemlock timber is the best for recribbing purposes. Use timbers of the same size, and after the framing is done creosote or char them to prevent decay.

Boiler tests run at odd intervals not only keep the master mechanic on the lookout for good work, but are of great educational value to the firemen, who are often anxious to learn the best methods, but frequently have no one well enough posted in boiler economy to teach them.

Where gas is found in small spaces or fissures, if the colliery is fairly damp, the best way of disposing of this dangerous element is to fill up the space with clay from the surface. If found in a hole, the bottom may be timbered across by wedging against the strata, using chips of wood for lagging and filling the space above with clay.

The United States Geological Survey has just published the best map yet produced showing the distribution and the nature of our coal resources. A considerable number of new fields have recently been discovered and are now mapped. The most important feature of the map is the distinction made between the various grades of coal.

The following precautions have been found of benefit in the prevention of miners' consumption: Mine air should be kept free from dust. Dust caused by a shot should be allowed to settle before the miner returns to work. When drilling upward or downward water should be used to prevent the escape of the dust. Dampen all broken rock before moving it.

The average time required to draw a coke oven by hand is about three hours, the average by existing machines is well within 15 min. There is thus a saving of 2¾ hours, which, if utilized, can be made to produce about 5 per cent. more coke. Much of this saving of time may be lost by antiquated methods of watering and delay in recharging the oven. The principal objection to coke-drawing machinery is that it breaks up the coal more or less in extraction.

The effect of galvanizing "plough"-steel wire has been found to be: 1. The ultimate tensile strength is not lowered while the elongation is doubled; 2. The capacity to resist bending is decreased 25 per cent.; 3. The capacity to resist torsion is reduced 20 per cent. Galvanized winding ropes are not advisable under all

conditions. They give good results in wet upcast shafts where the water is not acid-uous, but if the water is acid, brittleness may result owing to galvanic action and the formation of hydrogen.

A good dynamite thawer with a capacity of a case of dynamite at a time, can be made by burying a box in a pit filled with green manure which should be rammed hard. An iron pipe is used for a ventilator as well as a handle for lifting the cover. Such an arrangement will thaw dynamite in the coldest weather. Dynamite should not be stored in it longer than necessary for thawing, as the dampness from the ground and manure would in time injure the explosive.

When men are being hoisted, the use of detaching hooks, catches, rod-grips and gates to cages should be made compulsory, also when men are being raised or lowered, the cage should not be loaded with any other material, and should contain no greater weight than the men themselves. The hoisting of men should be done at a reduced speed; when the cage is within 20 yd. of the landing place, it should not be hoisted at a rate of more than three miles an hour, also when two cages pass each other the speed should be reduced.

Mine flushing has been largely adopted in Germany. Sand mixed with more or less dirt or clay is used. This material is dumped on a grid at the mouth of the shaft where it is thoroughly mixed with water. Cast-iron, wrought-iron or steel piping, 13 ft. in section, and 6 to 8 in. long is used for this work. The method as there used allows the filling of 90 per cent. of the volume of space, which so greatly reduces the strata pressure as to materially reduce the cost of timbering and permit the seam to be completely worked out.

The constant provision of suitable timber at the working face would go far in reducing the number of fatal accidents from falls of rock. Timber is sometimes hundreds of yards from the face and has to be conveyed along roads where it cannot be carried on top of the cars, in which case the props have to be dragged the whole distance; this tends to cause undue negligence on the part of the miners. A plentiful supply of caps should also be provided as their use adds to the supporting power and life of the timbering, as well as to the general safety of the mine.

The new Chinese mining law, which was issued the beginning of last November, in Peking, does not permit foreign capital to be employed directly in mining in China. If this law continues, it will be a long time before the mining industries of China will flourish. For in spite of the excellent natural advantages of an abundant supply of good raw materials and easy shipping facilities, essential changes in the Chinese methods of accounting will become necessary before the

investment of money in Chinese mines will assume a promising aspect to the foreign capitalist.

When the bottom on which a compressed-air plant is to be located is unsatisfactory, as often occurs when on filled-ground, or quicksand, a good bottom may be made by driving stones into the soft ground until the desired firmness is secured, and then building a sub-base of concrete over the whole bottom of the excavation. The best foundation for compressed-air plants is reinforced concrete, although stone or brick laid in cement are excellent but more expensive. To prevent the disintegration of a concrete foundation caused by oil that often gets upon it, coat the top several times with hot pitch.

Hose used on rock drills are likely to become cut by being dragged over rough stones. To prevent this, wind the hose with marline, which not only affords a protection against cuts but gives additional strength to the hose. Woven hose jackets of marline or cotton also give good results, although a jacket of this character stiffens the hose and makes it more difficult to handle, at the same time, it prevents kinking. The use of hose bound with soft round wire should be avoided as the wire if cut or broken unwinds easily and is apt to catch and render handling difficult. Hard, flat steel-wire winding when broken clings to the hose instead of unwinding. Elliptical wire winding imbedded in the cover affords protection and gives added strength to the hose. If too much oil is used in the air-compressor cylinder, it is apt to be carried through the pipes to the hose where it rots the inner lining. This danger may be eliminated by a more careful use of air receivers and reheaters.

One of the best devices for the detection of fire damp is the Alcohol Flame Tester which is able to detect as little as 0.5 per cent. of the gas. This device is used with the ordinary Gray safety lamp which is able to detect gas above 3 per cent. One-third of the inside of the lamp glass is painted black to afford a good background for the detection of the gas caps. When measuring the percentage of gas by the oil flame, the wick is lowered until it loses its bright tip and the gas cap, if present, can then be detected against the black background of the glass. If no cap is seen, this may indicate that less than 3 per cent. of gas is present. In order to test for this lower percentage of gas, remove the brass plug in the bottom of the lamp and attach the tester in its place; the heat from the oil flame will draw the alcohol up and light it from the oil flame. Then the oil wick should be lowered and its flame extinguished. The gas caps detected by the tester will be as follows:

Percentage of Gas.	Inch Gas Cap.
0.5	0.60 very pale, not clearly seen.
0.1	1.00 pale blue, clearly seen.
1.5	1.44 pale blue, clearly defined.
2.0	1.68 clear blue cone.
2.5	2.00 distinctly defined gas cap.

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End of the Alabama Strike

The strike of the union coal miners in Alabama is ended, through the intervention of President Lewis, of the United Mine Workers. His reasons, as given in the despatches, are that the pressure exerted by the State and local authorities has prevented the strikers from consulting together and has stopped concerted action; and that it would not be for the interest of the miners to remain out longer. This is an apparent present victory for the operators; but, on the other hand, it leaves the union men free to secure work, to strengthen their organization and to increase their numbers in preparation for another contest. The operators will, without doubt, adhere to their announced determination to operate the mines on the open-shop plan entirely, not recognizing the union at all.

The cause of the strikers was greatly weakened by their resort to violence, which gave occasion for the exercise of the police powers of the State in their strictest form, and also served to turn public opinion strongly against them, and in favor of the operators. The fact that a large proportion of the miners are negroes also had its influence on public opinion in a Southern State. In justice to this class, however, it may be said that they seem, from all accounts, to have been led by the white element, which was responsible for most of the violent outbreaks. This element is largely composed of foreigners, many of whom were brought in as strike-breakers three years ago.

The demand for coal and coke in Alabama is on the increase, and the open shop will have a full opportunity there. Probably a number of the strikers will return to work, now that they have the opportunity, though the operators will hardly take on the more conspicuous offenders against law and order.

Australian Gold Mining in 1908

Gold mining in the Commonwealth of Australia during the present year has continued to decline gradually, still showing the tendency which has been apparent for two or three years past. The partial exhaustion of some of the older mines, the abandonment of placer mining for more settled industrial occupations, and the ab-

sence of new discoveries of importance have all had a share in the decline. To these may be added the diversion of capital and labor to the mining of copper and other metals, which appeared to offer a greater present return.

For the half-year ended June 30 the official returns give the gold production as below, in fine ounces, South Australia being estimated:

GOLD PRODUCTION IN AUSTRALASIA.

	In ounces fine gold.		
	1907.	1908.	Changes.
Western Australia	838,253	827,017	D. 11,236
Victoria	336,110	320,677	D. 15,433
Queensland	227,077	214,861	D. 12,216
New South Wales	138,489	112,063	D. 26,426
South Australia	7,500	6,750	D. 750
Tasmania	32,085	26,528	D. 5,557
Total Commonwealth	1,579,514	1,507,896	D. 71,618
New Zealand	213,043	237,297	I. 24,254
Total gold	1,792,557	1,745,193	D. 47,364
Total value	\$37,052,153	\$36,073,139	D. \$979,014

The total for the Australian Commonwealth shows a decrease of 4.5 per cent. The gain in New Zealand reduces the decrease for all Australasia to 2.6 per cent.

The small decline in Western Australia gives some prospect of better returns for the remainder of the year. In fact, there was an increase in mining activity, and the returns for the second quarter of the year showed a marked improvement. Developments at the large mines of the Kalgoorlie district have been favorable. As last year the decline in production was due chiefly to the working of lower grades of ore, the recent improvement is attributed to the finding of better ore at Kalgoorlie as greater depth was reached.

In Victoria the decrease was due largely to smaller returns from alluvial mining. Ballarat, the most important quartz-mining district, showed a decrease in production, which was hardly offset by a gain in Bendigo, which is nearly as important. In Queensland there were reduced returns from nearly all the larger mines. In the Mount Morgan, the largest mine in the State, copper is steadily becoming a more important product than gold.

In New South Wales gold mining has been a declining industry for some time, and shows no present signs of improvement. Almost the same can be said of Tasmania, though the copper and tin mines of that State show no decrease of activity.

The gain in New Zealand was partly due to favorable returns from the great Waihi mine, which continues to improve with development. Operations in the Auckland district also gave favorable re-

sults. Dredging returns were well maintained, and this important branch of the New Zealand gold industry continues to be successful.

No progress has been made in the exploration of the Northern Territory, and though reports come of discoveries there occasionally, they have not been substantiated. The territory is still in large part an unknown land.

A Colliery Engineer for Gold Mines

A notable appointment just announced is that of H. Stuart Martin, one of the more prominent colliery engineers and managers of South Wales, to be consulting engineer for the mining house of H. Eckstein & Co., of Johannesburg. At first sight it seems remarkable that a firm controlling and managing a group of large gold mines should select a colliery engineer to advise them; but a little consideration suggests some reasons for this action.

Many of the important problems that face the mining community on the Rand are those associated with rapid haulage, ventilation and mechanical transport, and to deal with these problems an experienced colliery engineer is well fitted. The practice is now to form companies to work larger areas than formerly. By working on a larger scale economy in power costs and in management expenditure is obtained. The reduction of working costs carries with it a great increase in the quantity of ore that it will pay to mine. At the same time a reduction in the profit per ton is involved and if past profits are to be maintained, a corresponding increase in the output must be made.

The margin between profit and loss is constantly being reduced on the Rand, and the mining conditions are coming more and more to resemble those of a colliery. If the limit for vertical shafts is to be about 4000 ft. and the ground below that is to be developed by long inclines from the bottom of these vertical shafts, the exploitation of the deep ground will still more resemble colliery work. The direction of these large companies demands men who have had wide experience in handling labor and who are capable of introducing mechanical appliances for dealing with large tonnages at a minimum of cost.

The ventilation of these deep mines will also be a serious question and one which colliery engineers will be best fitted to solve. Some of these considerations may have influenced Eckstein & Co. in selecting Stuart Martin as their chief engineer. At any rate the selection indicates that the best method of opening up the deep level ground is to be carefully considered by an engineer familiar with the best colliery practice in England.

George's Creek Small Vein Coal

The differential of 15c. per ton, charged by the Baltimore & Ohio railroad for carrying small vein coal from the George's Creek field to Eastern points, was ordered removed by the Interstate Commerce Commission on Aug. 15. The fight for this reduction was made by the small local operators, who found it difficult to compete with the West Virginia and Pennsylvania shippers.

As a result of this new ruling, the George's Creek region will be greatly benefited, and many of the thinner seams which have not been actively developed, will now be worked with renewed vigor. The George's Creek district was one of the earliest of the Eastern fields to ship coal, and the "Big Vein," which has produced nearly the entire tonnage, is not far from exhaustion. This worked-out condition of the thicker seam has compelled the mining companies to give attention to the development of the smaller beds.

There is no good reason why the differential on the "Big Vein" coal should not also be removed and it is likely that if the operators should specifically ask for it, that discrimination also will be abolished.

Pyritic Smelting

We publish this week a particularly interesting metallurgical article in Mr. Nicholls' contribution upon pyritic smelting at Tilt Cove, Newfoundland, which was the practical birthplace of the art. Of course we are aware of the experiments, arguments and discussions that antedated the work at Tilt Cove, but it was there, we believe, that a blast furnace was first run continuously on pyritic ore with no addition of carbonaceous fuel. Even so, the process had the great drawback of a low concentration, and we used to think that although it had been amply proved that a furnace could be so

run, there was unlikely to be any wide application of the process or much prospect of commercial success. Indeed, the Tilt Cove process was in mind when about 12 years ago we made the remark that "pyritic smelting is an iridescent dream," which evoked the first great discussion upon this important subject. The history of the last 10 years has been a constant refutation of our former cynicism, in which no one has exulted more than ourselves; indeed, the discussion of that time, in which many well-known metallurgists took part was a great stimulus to attention to this branch of smelting and directly contributed to the advancement in knowledge and practice. Yet in spite of the multiplicity of technical papers published then and later, strange to say there has been nothing giving the details of the prototype of the method. Consequently, Mr. Nicholls' present contribution will be welcomed as a record of early experience, that is both of metallurgical and historical interest.

ATTENTION SHOULD be directed to a note on another page to the effect that in the deep alluvial mines of Victoria trouble is experienced from the escape of gas from the gravel during periods of falling barometer. We have repeatedly called attention to the probability that the flow of gas into collieries increases under similar conditions and have urged the observation of barometrical changes and the exercise of additional caution at dangerous times. Our campaign of education in this particular has had its effect. Many more mines are now provided with barometers than formerly and the superintendents and bosses note their readings and act accordingly.

THE GREAT STRIDES that have been made by the suction-gas producer in combination with the gas engine are evidenced by the report that the British naval authorities are going to give the combination a trial on shipboard, and great things are expected of it. This is heralded as a new discovery, but it has been in the minds of naval engineers for a long time. As long ago as the St. Louis exposition, Admiral Melville in private conversation expressed the belief that some day the gas producer might displace the boiler afloat as well as ashore. At that time this appeared like a remote possibility, yet now the beginning seems to be right at hand.

Views, Suggestions and Experiences of Readers

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

CORRESPONDENCE AND DISCUSSION

Alumina in Copper Blast Furnace Slags

Charles F. Shelby, in his exhaustive article on alumina, in the *JOURNAL* of Aug. 8, classing it as an acid in the formation of slags, opens up an interesting subject. I was pleased to see that he places Al_2O_3 where it belongs. I was surprised, as Mr. Shelby evidently was, that Dr. Edward D. Peters and Prof. L. S. Austin should remain in doubt as to whether this substance should be classed as an acid or a base.

Without reference to any authority on the subject, as I know of none at that time classing Al_2O_3 properly,¹ I classed alumina as an acid in my contribution to the *JOURNAL* of Aug. 6, 1901, as follows:

"I wish to call your attention to a little experience we had with alumina in the matting furnace at Silverton, Colo., where I was acting as consulting metallurgist. The ore we had to smelt contained, on an average, about 20 per cent. Al_2O_3 , 30 per cent. SiO_2 , and 18 per cent. Fe in the form of an iron pyrite, and no other iron was available except some iron-sulphide concentrates containing a small percentage of zinc and lead. The question naturally arose: could we oxidize and force sufficient of the iron into the slag, and where should we class the alumina, as a base or an acid? My experience in lead smelting led me to believe that Al_2O_3 could be classed as an acid in the ordinary lead furnace, and that it would be useless to class it otherwise in a shallow matting furnace; and E. W. Walter, the superintendent and metallurgist in charge, agreed with me.

"We then decided to make a bi-silicate slag, classing the alumina as silica, and we obtained fairly satisfactory results. The slag made was very clean, but treacherous, which was attributed to two reasons: (1) that it required more heat to keep the alumina slag liquid enough to flow than it does a nearly straight silica slag; and (2) that we were running so close to the formulas of a bi-silicate and aluminate slag (about 31.5 per cent. SiO_2 , 27 per cent. FeO, 20 per cent. CaO and 18 per cent. Al_2O_3 , or 49.5 per cent. acid) that

a few charges thrown into the furnace containing more silica or alumina than usual would thicken the slag so that it would then require some extra coke and flux to save the furnace. At times the combined SiO_2 and Al_2O_3 did reach 55 and 56 per cent. in the slag, which did not freeze up the furnace, but caused us trouble."

LIMIT OF QUANTITY IN SLAG

Again, in my article appearing in the *JOURNAL*, April 10, 1905: "Alumina for convenience, can be classed as silica, and I prefer to limit its use to 12 per cent. in the slag. To be exact, when figuring a bi-silicate slag for copper smelting, the formula would be:

$2Al_2O_3 + 3FeO = 48.8$ per cent. Al_2O_3 , that is, two oxygen in the acid to one oxygen in the base, classing the Al_2O_3 as an acid, which corresponds to the $FeO + SiO_2$ slag containing 45.6 per cent. SiO_2 ; or a $CaO + SiO_2$ slag with 51.9 per cent. SiO_2 . As the proportion of Al_2O_3 in the slag increases, the amount of SiO_2 should be reduced. To allow the SiO_2 and Al_2O_3 together to get above the bi-silicate limit will eventually cause trouble."

T. A. Rickard's work on "Pyrite Smelting," published in 1905, contains the following on the same subject, taken from an article of mine: "Of course, where parties are anxious to smelt as much silica as possible with as little flux as possible, and magnesium limerock is available, one would naturally think it would be a very desirable flux, as magnesia has nearly twice the combining power with silica that iron has, and nearly half as much again the combining power of lime, that is, for a bi-silicate where 1 per cent. CaO is equal to 1.07 per cent. SiO_2 , 1 per cent. MgO would be equal to 1.5 per cent. SiO_2 ; but we well know what an infusible slag we would get from a bi-silicate of magnesia. As a rule, I have found a bi-silicate slag, classing the alumina as an acid containing anywhere from 22 to 30 per cent. iron, that is, 28.3 per cent. to 38.6 per cent. FeO, respectively, to give excellent results, the balance being CaO, ZnO, etc. On several occasions I have endeavored to make a slag high in silica and alumina, in order to force the alumina to act as a base, and found that some of the silica would soon show on the surface of the slag pots not fused, and the slag would scarcely run. At other times I have been able to make slags extremely low in silica, on account of its alumina contents. Classing alumina as an acid, I

have successfully made slags extremely clean, containing over 20 per cent. alumina."

Mr. Shelby hits the nail squarely on the head when he says, "When it goes up the silica must go down, and there is no getting around it without more fuel and another type of slag."

It was in 1879 or 1880, when I was assayer and chemist at one of the smelters in Leadville, Colo., that another chemist and myself were discussing our different methods for making iron determinations, I explained that I titrated with a standard bichromate of potash solution; his method, which he considered quicker, was to precipitate the iron from an ammoniacal solution and weigh as sesquioxide of iron. When I remonstrated with him, claiming that most of the Al_2O_3 would be weighed up at the same time for iron, he claimed that it would make no difference since iron and alumina acted the same in the blast furnace. Up to within the last ten years, I have proofs that the same method of determining iron was employed at some of the smelters in Butte, Mont.; which goes to show how persistent a few of the old metallurgists are in classing Al_2O_3 as a base. With clean ore to smelt and low silica slags they did not realize that the Al_2O_3 was acting as an acid, and that their slags were near the form of a bi-silicate, including the Al_2O_3 with the SiO_2 .

ZINC IN SLAGS

Mr. Shelby, in his article on alumina, also refers to zinc, and seems to be in doubt as to where to class it. I am not so sure of the condition in which it enters the slag as I am in regard to alumina.

At the time I wrote my articles on "Pyrite Smelting," I thought perhaps it entered the slag as an oxide, forming a silicate. I took a similar view in the case of barium oxide (BaO) except that it is almost neutral on account of its low oxygen ratio. Since then, for several years, I have had to smelt ore containing a high percentage of both zinc and barium with considerable alumina, and found that the SiO_2 and Al_2O_3 had to be lowered and raised whenever the ZnO and BaO was lowered and raised, and that the safest way to class both ZnO and BaO was to consider them neutral. Referring to W. B. Bretherton's article on "Matte Smelting at Ingot, Cal.," in the *JOURNAL* of Feb. 29, the average composition of the slag was:

¹Prof. H. O. Hofman in his work "The Metallurgy of Lead," published in 1899; page 287, says: "From the composition of the typical lead slags it will be seen that the place alumina occupies in lead smelting is generally a subordinate one. When it is present in large quantities it becomes a question whether it acts as an acid or a base. It is known in a general way that with a high percentage of silica alumina acts as a base; with a low percentage it acts as an acid."

ZnO	12.00	
BaO	9.80	21.80
FeO	18.40	
CaO	19.50	
Cu	0.20	38.10
SiO ₂	28.60	
Al ₂ O ₃	10.00	
	38.60	
	1.00 ²	
	99.50	

The small percentage of copper no doubt exists in the slag as a sulphide, mechanically carried over. We found that if the SiO₂ were lowered 2 or 3 per cent. below that required by the formula, the slag would be too thin, and did not seem to be homogeneous; but the SiO₂ could be raised 4 to 5 per cent. higher with no serious effect, except a slower running of the furnace.

S. E. BRETHERTON.

San Francisco, Cal., Aug. 17, 1908.

Machine Drills for Stopping

My attention has been called to a letter by J. A. Farwell, secretary-treasurer of the J. G. Leyner Engineering Works Company, correcting two alleged misstatements made by me in an abstract of a paper of mine published under the above title in the JOURNAL of May 16, 1908. Had Mr. Farwell read my paper in the original he might have saved himself some trouble. The first statement taken exception to was: "In eight hours 40 ft. is drilled by a 2-in. Murphy drill against 25 ft. by a 2¼-in. piston drill, even though it does not drill as rapidly while running." I stated in the original paper that I got my information from technical literature regarding Cripple Creek. If Mr. Farwell wishes to correct anyone he should have corrected a similar statement made by G. E. Wolcott in the JOURNAL of July 20, 1907; the paragraph begins: "It is a mistake to assume that the value of the hammer drill lies in the fact that it will drill faster than the piston machine; for in most cases it will not." As it happens, Mr. Wolcott is probably right, and in any case Mr. Farwell's statement that a 1½-in. hammer drill will outdrill a 2¼-in. piston drill, taking out only the time of setting up, has nothing to do with my statement, which obviously referred to drilling speed in actual drilling time. I will deal with this matter more fully in a future article. Mr. Farwell next takes exception to my remark that

²We will assume that there is one per cent. more base, making 99.5 per cent. (there is usually some little sulphur in the slag, but seldom 0.5 per cent.); now if we take this 99.5 per cent. and deduct the 21.8 per cent. of ZnO and BaO, we may consider the remaining 77.7 per cent. of the slag approximating a true bi-silicate of the following composition:

FeO	23.68
CaO	25.09
Unknown base	1.29
	50.06
SiO ₂	36.80
Al ₂ O ₃	12.87
	49.67

any success which the Leyner and certain other drills may have had is due to the aid thus given to speed of drilling—referring to water and air injection in removing rock. This statement on the face of it meant only that the Leyner machine could not have been a success without water injection for the work it does. I had no idea of drawing comparisons between drilling speeds with air injected, or with water and air, or with water only. Emphasis is everywhere laid, both in the original paper and in the abstract, as well, in a reply to the discussion of the original paper, on the fact that such injection tends to remove rock as soon as chipped, whereas the solid steel ordinarily used in piston drills does not do so in flat or down holes. Surely the reason for greater drilling speed with air does not require a long scientific explanation (fortunately spared to us), but lies in the fact that dry particles under air pressure, being more mobile, are more rapidly removed from the cutting face.

E. M. WESTON.

Brakpan, Transvaal, July 26, 1908.

Manufacturers' Catalogs

Advertising in the technical journals brings inquiries of various sorts, some from people who are interested in the purchase of apparatus, others from persons who wish to inform themselves about the subject in question, and still others from persons who appear to apply merely through curiosity, or the desire to get something for nothing. Now, the majority of manufacturers, while they often spend considerable amounts in the preparation and printing of their catalogs and other trade literature, the bare cost of printing alone often running up to 50 or 60c. per volume, do not, as a rule, object to filling the requests of all three classes.

However, the publication of advertising literature is only one step in the selling campaign, and once the prospect has been opened, the organization of selling forces is such that other steps should follow, as it were, automatically. The next thing, therefore, for the salesman to do after receiving an inquiry and sending the literature requested, is to call upon or write to the inquirer to find out what his needs may be. This frequently leads to much waste of time and money. The man who asks for a catalog may not, as suggested above, be in the market, and if he is located in some out-of-the-way place, it costs a good deal to find this out by means of a personal call.

The point I wish to bring out is that persons who ask for catalogs should at the least acknowledge receipt of the printed matter, and of the letter which usually accompanies it, stating whether or not they expect to purchase in the near future. They rarely ever do this, thereby putting not only the manufacturer, but

often themselves also, to some inconvenience and annoyance. Inasmuch as the manufacturer has gone to the expense of printing this matter and of mailing it, a simple acknowledgment would seem to be in order, especially since many manufacturers now inclose return postal cards, oftentimes stamped, for this very purpose.

GEO. H. GIBSON.

New York, Aug. 22, 1908.

Ethics of the Proposed Mexican Mining Law

Art. 144—"Foreign corporate bodies are incapable of denouncing and acquiring henceforth, by any process, either mining properties or liens thereon, within the territory of the Mexican Republic."

This clause in the proposed new mining code has aroused considerable acrimonious discussion among the mining fraternity in Mexico. Everyone, apparently, who questions the desirability or expediency of the measure, concedes the *right* to legislators to promulgate and enforce such a law.

What is meant by *right*? Doubtless, it is not intended by the framers of the much-debated clause that it shall effect present holders of mining property, or be prejudicial to legitimate mining interests. If it shall prove unjust and confiscatory in its action, where does the *right* come in?

Three foreign residents, not capitalists, but just ordinary workmen, have subscribed 5000 pesos each (practically all their hard-earned wages) in the purchase and development of a small mining property under existing laws, with the view, when values are in sight, to place the property on the market for sale. Apply the proposed clause to the case and where are the life savings of the workmen? Has any government the right to act in such an arbitrary manner?

A foreign merchant placed orders abroad for merchandise, consisting of ready-made clothing, hardware and groceries, amounting to several thousand dollars. Article 144 goes into effect, resulting in the stoppage of development, throwing hundreds of miners out of work, and the merchant is ruined. Is this right? Many things have been done by individuals and by nations from expediency or from fear, but by no stretch of the imagination could they be called right. Let us clear the moral atmosphere a little and see where we stand.

DAVID WALLACE.

Mexico, Aug. 18, 1908.

The stamp duty at the Village Main Reef mill during 1907 was 6,095 tons per 24 hr.; in 1906 it was 5,526 tons. The extraction was increased from 91.9 per cent. in 1906, to 95.3 per cent. in 1907.

Chronology of Mining, August

Aug. 1—The Heinze interest in the Ohio Copper Company property in Bingham Cañon, Utah, is taken over by a syndicate.

Aug. 2—Forest fires in the territory about Fernie and Crows Nest Pass, B. C., destroy large quantities of timber, coal, coke, rolling stock and mining property.

Aug. 9—Striking miners of the Tennessee Coal, Iron and Railroad Company fire upon a train carrying deputies and strike breakers and kill three men and wound two.

Aug. 11—Explosion of firedamp in the Dodweiler colliery at Saarbrucken, Germany, kills 12 men and seriously injures eight others. The price of silver touches another low point, the lowest in seven years.

Aug. 17—Indiana coal miners' strike affects 10,000 men. Strikes in Ohio affect 28 mines. Low water in the Ohio river closes the coal mines along the Monongahela river.

Aug. 18—Explosion in the Maypole colliery at Wigan, England, destroys headframe and fans and kills 76 miners.

Aug. 26—Fire in the Hailey-Ola coal mine No. 1, near Haileyville, Okla., kills 30 miners.

Aug. 27—The Alvarado Consolidated Mines Company, a Maine corporation, with \$10,000,000 capital, takes over the lease of the Palmillo mine at Parral, Chihuahua, from the Coram syndicate of Boston.

Aug. 28—Five men were killed and six seriously injured in a runaway-car accident at the Warren Run colliery of the Lehigh Valley Coal Company, near Wilkesbarre, Penn.

Republic Iron and Steel Company

This company owns a number of plants, including blast furnaces, steel works, puddling and rolling mills; also coal and iron mines and limestone quarries. It is the largest producer of bar iron in the country. Its latest report is for the year ended June 30, 1908.

The capital account shows \$27,191,000 common stock; \$20,416,900 preferred stock; \$8,891,000 bonds. The surplus of quick assets over current liabilities at the end of the year was \$6,713,821, constituting the working capital. The reserves of raw material owned in the various mining properties are estimated as follows: Coal unmined, 198,815,135 tons; iron ore, 124,113,235 tons; limestone, 31,546,800 tons. Of the iron ore reserves 88,685,439 tons are in the South, the remaining 34,427,796 tons mainly in the Lake Superior region.

The report shows the extent of the depression in the iron trade. The gross volume of business done decreased from \$31,227,423 in 1906-7 to \$18,693,881 in 1907-8. The income account was as fol-

lows; net earnings being the sums remaining after paying working and general expenses and all maintenance charges:

	1906-7.	1907-8.	Changes.
Net earnings.....	\$5,027,741	\$3,046,619	D. \$1,981,122
Depreciation and interest.....	\$1,298,496	\$1,075,199	D. \$ 223,297
Preferred dividends.....	1,429,183	1,071,887	D. 357,296
Total.....	\$2,727,679	\$2,147,086	D. \$ 580,593
Surplus.....	\$2,300,062	\$ 899,533	D. \$1,400,529

Adding surplus from previous year, the total surplus June 30, 1908, was \$4,699,527, a decrease of \$733,818 during the year. Expenditures for new construction during the year were \$837,143 and for property bought, \$298,992; against these is \$230,099 for property sold, making a net expenditure of \$906,036.

At the close of the year there was \$357,296 due on preferred dividends. One dividend was passed during the year.

The production statement is as follows, in long tons:

	1907.	1908.	Changes.
Iron ore mined.....	947,069	1,02,460	I. 78,391
Coke made.....	521,561	426,968	D. 94,593
Pig iron made.....	614,954	494,676	D. 120,278
Steel ingots.....	546,645	341,905	D. 204,660
Billets, blooms, etc.	488,251	303,328	D. 184,923
Finished products.	804,360	434,280	D. 370,130

Unfilled orders on hand at the close of the year included 59,196 tons of pig iron and 283,743 tons of finished products; decreases of 15,304 and 164,884 tons, respectively, as compared with the previous year.

The company owns 538 coke ovens in the Northern and 1010 in the Southern district; 1548 in all.

The report says: "The total expenditure for labor in the year was \$5,832,631, as compared with \$8,686,604 in the preceding year and \$7,735,903 in the year ending June 30, 1906. The average number of men employed at Northern works was 5895 in the fiscal year, as against 10,679 and 9065, respectively, in the two preceding years. The average number employed at Southern works was 2652, as against 3216 and 2600, respectively. The average number at all works was 8547, as against 13,895 and 11,665, respectively, in the preceding years."

"With reduced demand for iron and steel, the market values of products suffered declines, and to assist in bringing about lower costs to meet the change in business conditions, labor schedules were generally revised. Your committee is gratified to say that reduced labor rates were put into effect without disturbance to your amicable relations with labor, except at the Alabama mines, where a part of the miners are out on a strike, but no serious interference to operations has resulted, and full operation South is anticipated in a short time. * * *

"Your income figures for the year show severe declines as compared with the high mark of earnings recorded during the previous year. While normal earnings were realized during the first quarter of the fiscal year ending June 30, 1908,

subsequent periods were seriously affected by the October panic, which caused complete paralysis of the company's business for approximately two months. This condition was followed by a slow business recovery, beginning in January with a volume of shipments approximately 25 per cent. of normal, the succeeding months showing a slow gain in volume to June, which recorded a maximum tonnage 52 per cent. of normal. * * *

"Notwithstanding the reduced volume of business, your manufacturing costs have not only been maintained, but show reductions as compared with periods of normal operations. This favorable showing has been influenced somewhat by the greater efficiency of labor and by general retrenchment, but is more largely due to the better physical condition of your properties and to a more nearly self-contained operation."

Metal Production of North Carolina

By H. D. McCaskey

The following table shows the production of gold, silver, and copper in North Carolina, by counties, in 1907. The figures have been obtained by the United States Geological Survey directly from the mines:

Counties.	Gold, Oz.	Silver, Oz.	Copper, Lb.	Total Value.
Burke.....	144	20	.....	\$ 2,989
Cabarrus.....	74	2	.....	1,522
Catawba and Gaston.....	318	68	.....	6,619
Davidson and Stanly.....	21	165	14,044	3,354
Franklin.....	57	3	.....	1,188
Guilford.....	90	.....	.....	1,863
Granville and Person.....	14	6,746	286,021	61,947
McDowell and Rutherford.....	21	2	.....	447
Mecklenburg.....	375	.....	.....	7,744
Montgomery.....	2,537	621	.....	52,848
Moore.....	11	2	.....	226
Randolph and Rowan.....	193	14,004	282,017	69,629
Union and others.	121	33	.....	2,533
Total.....	3,976	21,666	582,082	\$212,909
Total, 1906.....	3,973	30,768	703,775	238,575

Some copper from Guilford is included in Davidson county. The chief decrease in the output of the State, as compared with 1906, results from the greatly curtailed production of copper ores at the close of the year, which was due to unfavorable industrial conditions. Notwithstanding the financial depression, however, 1907 may be considered a successful year in gold mining in North Carolina, and the State maintained her rank as first in quantity of gold production among the Eastern States.

A 0.5-per cent. grade is generally satisfactory in mine drifts where the tramming is done by men or by horses.

Personal

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

R. H. Toll, of Denver, is examining mines in the Montezuma district, Colo.

M. L. Allen, of New York, is in Goldfield, Nev., looking after mining interests there.

Edward S. Wiard will return from Cobalt, Ont., to Denver, Colo., early in September.

L. L. Hutchinson has been appointed assistant director of the Geological Survey of Oklahoma.

A. E. May lately returned to the Inde camp of Durango, Mexico, to direct operations at the Guadalupe mine, of which he is manager.

W. A. Pomeroy has succeeded R. W. Bissell, as manager of the properties of the Lustre Mining and Smelting Company, Santa Maria del Oro, Durango, Mexico.

Lee Fraser, formerly engineer for the Consolidated Coal Company, Saginaw, Mich., has accepted a position as engineer with the Aguacate Mines, Inc., at San Mateo, Costa Rica, Central America.

Norval J. Welsh has returned to San Antonio, Tex., after six weeks spent in the western part of the State of Chihuahua, Mexico; he will shortly be at the Engineers' Club, New York, for an indefinite stay.

E. E. Ellis, recently assistant geologist for the Oliver Iron Mining Company, at Duluth, Minn., has assumed his new duties as geologist of the Tennessee Coal, Iron and Railroad Company, with headquarters at Birmingham, Alabama.

George E. Howard, manager of the Sahuayacan Mining Company, has returned to the properties in western Chihuahua, after an extended trip to the United States. He was accompanied by two Pittsburg stockholders, P. A. Shaner and C. W. Smith.

Carl F. Dietz, mining engineer, has returned from Norway where he has been engaged professionally for the last 10 months. He is now going to visit Santa Barbara, Mexico, and Salt Lake City, Utah. His permanent address is Melrose Highlands, Massachusetts.

Victor Watteyne, chief of the Bureau of Mines, of Belgium, arrived in New York Aug. 25, and at once proceeded to Pittsburg. Mr. Watteyne, who is one of the best known coal-mining experts in Europe, comes to this country on invitation of the United States Government to consult with the officers of the Geological Survey on mining conditions and measures for securing safety in mines.

Dr. Franklin R. Carpenter has completed a full survey of the Uinta oilfield

of Wyoming, and later an examination of the Asmus Boysen Concession in the Big Horn cañon, and is now in the Seven Troughs mining section of Nevada, where he is examining property for Eastern investors. He is there with a view of putting up a free-milling gold plant followed by a cyanide mill, something after the plan of the Homestake mill in South Dakota. Doctor Carpenter will return to his Denver office about Sept. 10 next.

Obituary

William Weihe, who died in Pittsburg, Aug. 24, was known to all iron and steel manufacturers, having been for over 10 years president of the Amalgamated Association of Iron, Steel and Tin Workers, the oldest and one of the largest labor unions in the country. He was in office at the time of the great Homestead strike in 1892. He retired some years ago, and had since been in the employ of the Government.

Recent advices from Tonquin state that George R. Fearby, the well-known Australian mining engineer, and his colleague, a Mr. Campbell, also an Australian engineer, have been murdered on a gold mine near Tonquin, Indo-China, by Chinese robbers. Mr. Fearby was as well known in the Orient as in Australia. He developed the Raub mine, in the Malay States, for an Australian company, and for many years has resided in the Orient, where he held the management of large gold and tin mines. At the time of his death he was managing several important mining operations for English and French mining companies. Mr. Fearby was 60 years of age. He was a miner of long experience, and a man of sterling character, who possessed an extraordinary aptitude in managing native labor.

Societies and Technical Schools

Columbia University—This institution in New York will offer at night during the year 1908-09 twenty evening courses specially adapted to the needs of technical and professional workers. This includes work in applied mechanics, applied physics, architecture, electricity, fine arts, industrial chemistry, mathematics, surveying and structures. The work will begin Oct. 26, and continue for 25 weeks.

Oklahoma Geological Survey—This survey, the organization of which was noted recently, has already five parties in the field, under the supervision of Charles N. Gould, director, and L. L. Hutchinson, assistant director. One party in the western part of the State is examining salt and gypsum deposits. Two parties are

in the oilfields, one near Deming and the other east of Tulsa. Another party is in the southeast part of the State, examining building-stone beds. The fifth is in the Arbuckle mountains. The work of mapping and describing the natural resources of the State will be pushed as fast as possible.

Virginia Polytechnic Institute—Arrangements are being made to open the new mining department of this institution at Blacksburg, Va. Courses have been arranged, and the work for the coming year laid out under the direction of Prof. O. C. Burkhart, who is at the head of the department. A building is under construction, which will contain the mining laboratory, assay office, lecture room and offices. The situation of the school is excellent, being near extensive coalfields, so that practical examples of mining work are within easy reach.

Nova Scotia Technical College—On Aug. 20 the cornerstone of the Nova Scotia Technical College, Halifax, was laid by Lieut.-Gov. Fraser of that Province in the presence of a large gathering. Premier Murray spoke of the work done by the provincial government for technical education and regarded the establishment of the new college as a great step in advance. President Falconer, of Toronto University, said that the question was of such national importance that the assistance given by the Province would have to be supplemented by Federal action. Other speakers were A. H. MacKay, provincial superintendent of education; Dr. Allison, president of Mount Allison College; Dr. Hutcheson, president of Acadia College, Wolfville, N. S.; Dr. Boulden, president of Kings College, Windsor, N. S.; and Dr. Eben MacKay, of Dalhousie College, Halifax.

Canadian Mining Institute—The summer excursion arrived at Glace Bay, N. S., on Aug. 26. The party, numbering upward of 50, included a number of prominent European mining and metallurgical experts. At Glace Bay they visited the collieries of the Dominion Coal Company, as the guests of the company and were accompanied by President James Ross, General Manager G. A. Duggan, Superintendent Charles Fergie, Lieutenant-Governor Fraser, C. J. Coll, president of the Nova Scotia Mining Society, and others. They were entertained at luncheon in the technical school building, and in the evening were the guests of the Nova Scotia Mining Society at an informal smoker at the Sydney Hotel.

On Aug. 27 the plant of the Dominion Iron and Steel Company, Sydney, was visited. The German and Belgian metallurgists were greatly impressed with the magnitude of the works and their equipment. The visitors were the guests of the company at luncheon. They left Sydney for the Acadia Coal Company's colliery at Stellarton, Nova Scotia.

Special Correspondence from Mining Centers

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

REVIEWS OF IMPORTANT EVENTS

San Francisco

Aug. 28—In the Old China tunnel in the west side of the mountain, where no work has been done for a year or more, the owners of the Brown Bear mine at Deadwood, Trinity county, have found 4 to 6 ft. of gold ore. The Brown Bear was for years a steady producer and was extensively developed, mainly by long tunnels, of which the China tunnel is one. In this latter the ledge was lost while leasers were working it, and it was only a few weeks ago that the company began work there on its own account.

The Jumper mine of Tuolumne county, for many years a large producer of gold during the time it was owned by the Scotch syndicate, has lately been transferred to new interests who have set a number of men at work and regularly resumed operations.

The arrangements being made for extensive development work on the Idaho-Maryland mine at Grass Valley, Nevada county, are such that in the reopening of the mine prospecting can be carried into new territory. The developments beyond and in the footwall of the east end of the old 500 level give assurance of the existence of ore-shoots in unexplored portions of the company's holdings. Three shifts will be put at work in the shaft and three in the 700 level. The shaft has been re- timbered to the 800 level, and by employing three shifts it will not be long before the 1000 station is reached. The pump at the 1000 station will be recovered and set at work and then a drift will be run back into the Eureka ground. The new ledge on the 500 level carries 8 ft. of quartz of good average value, and some rich specimen ore is also found.

The smelting plant of the Mammoth Copper Company at Kennett, Shasta county, is now making its maximum output and for the first time in its history, four furnaces are reducing full charges daily. The cars on the new gravity tram bring from the Mammoth mine to the smelter 100 tons of ore daily. The company, through its new mine superintendent, Robert E. Hanley, has lately issued orders that no liquors be allowed on the premises. At Coram, in the same county, where the Balaklala Consolidated Copper Company has its 1250-ton smelter, with reverberatories, roasters, etc., machinery for the converter plant is now arriving, and additional bunkers are being built. A shipload of coke is being received, as well as carloads of lime rock, which with quartz ore from Old Diggings district,

will be used as flux. The Balaklala smelter is expected to be blown in within two months.

The concentrating machinery formerly at the Bonanza King mine, Trinity Center, Trinity county, is now being delivered for use at the Midas mine, Harrison gulch, Shasta county. It was hauled by team 145 miles.

In Siskiyou county, Mr. Holmes of Tacoma, principal owner in the Giant Mining Company, of Greenview, has secured the interests of the other partners and has returned with funds to liquidate all the indebtedness against the property, so mine and mill will shortly be started up again.

Bishop, Inyo county, advices report that within the past three or four weeks the sections tributary to Bishop have displayed greater activity than ever before in their history. Important discoveries at the Black Cañon, Red Rose, Southern Belle, Bishop Creek, Casa Diablo and other prominent properties, as well as at other mines, have brought the mines of Inyo prominently to the front. The comparatively new camp of Skidoo, notwithstanding the drawbacks of lack of water, withdrawal of the Nevada stage line, financial depression, etc., continues active, and the letting of leases in various properties continues.

The mine of the Santa Ana Tin Mining Company, in Trabuco cañon, on the border of Orange and Riverside counties, seems to be no longer considered as a "tin prospect," as the mill is being prepared for a run on the "black ore" for its supposed gold content.

In response to an invitation from attorneys representing the Selby Smelting Company, the board of supervisors of Solano county will at the end of the week visit the works for further inspection of the work being done in the way of installing and maintaining appliances to handle the fumes. Pending a settlement, the smelting plant is closed down, and shipments of California and Nevada lead ores, formerly sent to Selby's, are being consigned to the United States Smelting Company, Bingham Junction, Utah. This leads Los Angeles men to hope once more for a modern smelting plant in the vicinity of that city. Arrangements are being made in Los Angeles to incorporate a company to erect a smelting plant within 50 miles of the city, on the sea shore.

The Salt Lake & California Copper Company has purchased a number of copper claims in the Low Divide district of Del Norte county, and has been cleaning

out and retimbering tunnels, and doing some prospecting work on the claims. It has now made a test shipment (by sea) of 100 tons of the ore. Thirty or 40 years ago these mines used to ship copper ore to Baltimore and to Swansea, but they have long been idle. It will depend upon the recent test shipment whether or not the mines will continue to be worked at present.

Goldfield

Aug. 25—Thomas G. Lockhart, who is in control of the Florence Goldfield Mining Company, is in contempt of court as a result of the litigation between the company and the company that owns the famous Little Florence lease. Lockhart sued the leasing company for damages, alleging that the method of doing underground work was a breach of the leasing contract, and withheld \$167,000 due the leasing company for ore extracted and shipped. The district court has ordered the \$167,000 impounded pending the decision of the suits. Lockhart refused to pay this money into the court, and instead appealed the case to the Supreme Court. That court sustains the district court's contempt order.

Loftus & Davis of Goldfield, have filed an attachment suit for \$36,300 against the Bullfrog Gold Bar mine. The property was considered one of the biggest in the Bullfrog district, and the failure of its mill was a grievous disappointment. There is a feeling among the minority stockholders that the object of this move is one to throw the property into the hands of the president and general manager, who are the largest stockholders.

The lease of the Elk Consolidated Company on the Yellow Tiger mine, is reported to have found good ore on the 720-ft. level. No visitors are allowed underground, but the miners are buying the stock. The shaft is the deepest in Goldfield, and has the only steel head-frame in the camp. Ever since the quartz dike was cut, good assays have been obtained, the small streaks giving high assays. If this strike develops into a commercial orebody, the limits of the ore-zone will be extended more than a mile. At present the Florence mine is the shipper nearest to the Yellow Tiger.

A four-cornered legal battle is being waged for the 487,500 shares of stock of the Keane Wonder Mining Company, held by the State Bank and Trust Company, now defunct. The principals are Homer Wilson, Edward Wedekind, D. Mackenzie

for the Frances-Mohawk Mining and Leasing Company, and T. B. Rickey for the State Bank and Trust Company. Wedekind's answer just filed with the court puts a new and interesting light on the case. He asks for half of the 975,000 shares standing in the name of Homer Wilson. He claims that he secured the option on the Keane Wonder and that Wilson claimed to be able to finance the deal. Wilson owed the State bank \$10,000, and to protect this loan he got the bank to finance his Keane Wonder deal and take the stock for security. Wilson drew drafts on the bank sufficient to pay for the 975,000 shares of stock which was made out in Wilson's name and held by the bank as collateral. The answer of Wedekind further declares that Wilson drew on the bank for more than \$100,000, which was converted in part to Wilson's own use and benefit. Wedekind alleges that the Keane Wonder is a going concern and is producing considerable money each month, and that in proper hands it would pay any indebtedness and release all liens, and his answer prays the court to award him 487,500 shares of the stock, being his undivided half interest according to his original contract with Wilson.

The Florence ground is the center of activity and interest of the camp at present. The dike extending from the old Zinn workings in the Jumbo ground is traceable across the flat to the heart of the Florence property, and actual work is being done on its entire length. This dike outcrops in one place in the flat near the track of the Bullfrog railroad, where three years ago a lucky prospector took out a wagon load of rich ore from practically surface workings. Next to the old Zinn Jumbo lease is the Zinn Florence, which has a good underground showing. This lease was formerly the Queen lease and under former management a shaft was sunk 500 ft. and four levels were driven. It has now been sub-leased. On the 185-ft. level a drift is being pushed to catch the Baby Florence lead further south.

The Florence Consolidated adjoins the Zinn on the west and has shipping ore in small quantities. It has been a shipper intermittently for 18 months. The Florence Jumbo lease, familiarly known as the Polenz lease, managed by Von Polenz, a German count, has a shaft down 273 ft., and three shifts are sinking as rapidly as possible to the 400-ft. level. Ore was found on the 250-ft. level and it is the intention of the management to get under the ore and mine it to the best advantage.

The Winston lease has resumed work after a long period of idleness. Farther south is the Baby Florence, where the high-grade ledge has been encountered and the indications now are that it will be one of the rich producers of the camp. The Gem Florence is shipping high grade in small quantities, and still farther south is the Engineers lease, which has paid \$275,000 dividends within 60 days after

the ore was encountered. On the south end of the property the Pollard Florence has attained a depth of 500 ft., and has struck spots of very rich ore.

Wallace, Idaho

Aug. 28—Three and one-half feet of good concentrating ore has been unexpectedly encountered in the property of the Black Horse mine near Wardner. This ore was encountered at a point about 50 ft. from where the adit is being run to tap the main lead. This is about 760 ft. from the portal of the tunnel, and at an approximate depth of about 1000 ft. The men will continue to drive for the main lead, and the new strike will not be explored until this has been encountered.

The stockholders of the Mineral Farm property near Mullan have been asked to vote on an assessment about to be levied by the company. This assessment will be at the rate of either three or five mills a share, according to the voice of the majority. Accompanying the ballot sent to each stockholder is a full report of the workings of the mine. The principal purpose for which the assessment will be levied will be the driving of an 1100-ft. tunnel and the sinking of a 250-ft. shaft.

A report which appears to be well founded on fact is in circulation throughout the district to the effect that the Lacasse placer property on Cedar creek has been purchased by a syndicate of Kansas City capitalists. Bids are being asked for mining and dredging machinery to be put on the ground.

F. Cushing Moore, of Wallace, has been selected by the Republican party to make the race on the State ticket for nomination to the office of State mining inspector. A keen fight for the endorsement of the Shoshone county delegation developed in the convention held at Burke. The names of W. H. North and F. Cushing Moore were both placed in nomination and on a ballot being taken the endorsement went to the latter by a vote of 47 to 51. No effort will be spared to secure this office for Shoshone county at the State convention to be held in Boise. Practically all the large mining interests of Idaho are located here and the operators believe that they are entitled to the office.

A strike of three ft. of rich lead carbonate ore, carrying some gray copper and native silver, has been made on the property of the Coeur d'Alene Vulcan property, about 2½ miles west of Wallace and adjoining the old Argentine mine. Two feet of good copper ore has been encountered in the drift being run west on the main lead in the Copper Crown property. A contract for 300 ft. of work has been let on the property of the Gold Crag Mining Company, owned by Colonel Fuller, of Wallace. The vein in the Comstock property at Burke has widened out in the last 50 ft. of drifting from 3 to 15 ft. The tunnel is now in

250 ft. and the company proposes to extend it 500 ft. more this season.

An announcement has been made in the Coeur d'Alene to the effect that a company will be formed at once to merge the interests of the Amador Gold and Copper Mining and Milling Company, the Amador Railroad Company and the Amador Smelting Company. The Amador mine is near the Montana-Idaho divide. A syndicate of Wallace business men has taken a two years' lease of the property of the Josephine Copper Mining Company, near Stark, Mont., together with an option to purchase within two years from Aug. 10.

Manager H. Nordquist has a force of 13 men employed in building a wagon road from the county road to the Imperial mine, in Saw Mill gulch, about one mile east of Burke. A compressor building is being erected and by the middle of September it is expected that work of driving the 2700-ft. adit will be started. An assessment of five mills a share has been levied on the stock of the Alameda Mining Company, payable Sept. 20 and delinquent 30 days after that date. The money raised will be used to prosecute work on the property.

The recent strike on the property of the Great Western Mining Company, near Burke, has now widened out to about 24 ft. of milling ore at a depth from the surface of about 75 ft. Another adit is being driven to tap the vein.

Salt Lake City

Aug. 28—Considerable interest is manifested in the negotiations pending between the Utah Consolidated Company and the Garfield Smelting Company regarding a smelting contract. Upon the outcome depends whether the Utah Consolidated company will build a large smelting plant of its own in Tooele county or not. Under the provisions of a two-years' contract the Utah Consolidated is shipping an average of 800 tons of ore per day to Garfield. A five-year contract as favorable to the shipper as the one now in existence is sought, but the smelter management hesitates about granting such a contract until further determinations are made as to the metallurgical efficiency of the Garfield smeltery. However, according to an official of the smelting company, the matter will soon be decided, at least before the end of September. The Utah Consolidated, soon after its Murray plant was closed last January through an injunction resulting from the adverse decision in the smelter-smoke cases, purchased lands and water rights near Tooele City, Tooele county, and began to plan the erection of a plant to cost from \$1,000,000 to \$1,500,000, but the contract with the smelting company has delayed, temporarily at least, further work in this matter.

Samuel Newhouse has donated to the Salt Lake Stock and Mining Exchange

a lot valued at \$50,000, upon which an exchange building will be erected. The building is to cost at least \$100,000. The money has been practically all pledged.

Negotiations for a merger of the Talisman and Cedar mines in Beaver county are practically concluded. Both mines have shipped considerable lead-silver ore.

The Utah Mine Company, operating at Fish Springs, has declared the usual monthly dividend of 3c. a share, or \$3000, payable Aug. 25. The directors have also purchased the Last Chance claim, a valuable adjoining property.

The lead smelter of the United States Company is still operating four furnaces on oxidized ore, and this week began the treatment of sulphide ore in two of the new converter roasters. This company is actively seeking custom ores, and when the Selby plant near San Francisco was closed recently through the operation of an injunction, a representative was despatched to the Pacific Coast to hunt for business. It is said that he has met with considerable success in buying ore.

Butte

Aug. 29—At a meeting of the directors of the Davis-Daly Estates Copper Company, held in Boston last week, the first definite action toward a reorganization of the company was taken. An agreement was entered into between the company, first party; J. A. Coram, F. A. Heinze and Charles Leonard, second parties; and T. M. T. Roberg, third party, representing the syndicate which has offered to underwrite the stock of the new company to be formed. This agreement provides that the directors shall call a special meeting of stockholders for the purpose of laying before them the offer of the syndicate and that a favorable vote of 65 per cent. of the stock shall be necessary to accept the offer. The directors have already called a meeting of stockholders for September 5. In the circular letter, notifying stockholders of the meeting, the proposal made by the syndicate, and to be acted upon by the stockholders, is set forth as follows: The syndicate is to form a new corporation, capitalized at \$6,700,000 with 670,000 shares of stock. The old company is to transfer all of its property of whatsoever nature to the new corporation. The new corporation, in consideration of the transfer, is (1) to pay to the old company \$300,000; (2) to pay off the old company's indebtedness to an amount not to exceed \$85,000; (3) to give each shareholder in the present company an option to purchase shares in the new company for \$2 per share, said \$2 to be paid in four installments of 50c. each; (4) to make payments, not exceeding \$445,000 on the options held by the present company as such options may become due. The syndicate is to receive 15 per cent. commission for the flotation.

Indianapolis

Sept. 1—A number of miners were caught in the Summit mine, near Linton, Aug. 27, by a fall of several hundred tons of slate. By rapid work from outside and inside by the men a small hole was cut through the fall and the men came through one at a time. The men were almost suffocated when rescued.

The coal mines of Indiana are being praised by W. F. Harrison, an expert in the employ of the Geological Survey of the United States. Mr. Harrison is investigating the quality of Indiana coal from the point of view of coke-making and gas-making, and has been in practically every mine of importance in the State. In all cases he has been favorably impressed with the manner of handling coal in this district. "The Indiana mines," Mr. Harrison said, "are without exception the best soft-coal mines I have ever examined during 12 years of employment in the examination of mines in this country, for uniformly modern methods of handling coal with safety to miners and with salvage of coal mined. The Indiana operators are more up to date in machinery used. There are more electrically-operated mines, more modern drilling, more modern hoisting and ventilating plants."

Mr. Harrison, however, is not optimistic relative to the quality of Indiana coal for coke-making. "It is excellent steam coal, gaining friends rapidly, but I do not think it is a first-class gas-producing and coke-producing coal. The coal is not hard enough to make first-class coke. It will make coke, but it will be second, not first."

Toronto, Ont.

Sept. 1—A parliamentary return of Canadian bounties paid on iron and steel for the fiscal year ended March 31, 1908, shows \$863,816 on pig iron, \$1,092,200 on steel and \$347,134 on iron rods. Bounties on lead amounted to \$51,001, and on petroleum to \$391,217.

The Temiskaming & Northern Ontario Railway Commission is advertising for tenders for mining leases of several properties at Cobalt, including the Cobalt station grounds, with rights-of-way adjoining amounting in all to about 17 acres; the westerly portion of lot 44 in Cobalt townsite, 4½ acres; and three other townsite lots including mining rights under adjoining streets. The leases will, as in the cases of Cobalt lake, be subject to a royalty of 25 per cent. of the gross value of the output. Tenders will be received up to Sept. 16.

A meeting of the directors of the Crow's Nest Pass Coal Company was held in Toronto on Aug. 7, at which President Lindsey, now at Fernie, B. C., was authorized to rebuild those portions of the plant which were destroyed by the recent forest fire. These include the hospital and the coke-oven plant. The net cost to the company is estimated at about

\$50,000, as the insurance of \$150,000 will cover the balance of the loss, the total being about \$200,000. Coal mining has been resumed and it is expected that the normal output will be attained this week.

London

Aug. 22—The reconstruction scheme of the Central Mining and Investment Corporation, Ltd., was carried at an extraordinary general meeting held on Aug. 10. The capital of £6,000,000, in £20 shares, is now reduced to £3,600,000, in shares of £12 each, by canceling £4 per share and paying off £4 per share in the shape of a debenture. Wernher, Beit & Co., the promoters of the company, are to receive 20 per cent. of the profits after 5 per cent. on the capital has been paid instead of 25 per cent., which was the figure originally agreed upon, but the undertaking of the firm to offer the Central Mining and Investment Company a 30-per cent. interest in their future gold mining business in South Africa was to continue unchanged.

The chairman referred to some remarks he had made at a previous meeting about disappointing results obtained in some of the very deep level mines, and said that he had not perhaps made it sufficiently clear that so far very little development work had been done. He pointed out that until further work was done, it would be unfair to condemn these mines, because the earlier development was disappointing. He quoted the Brakpan and City Deep mines as instances of companies which had had pleasant surprises as work progressed. In both of these mines important strikes have recently been made.

The directors of the Camp Bird, Ltd., have issued their report for the year ended April 30, 1908. The company owns the well known gold mine, high up in the mountains of Ouray, Colo., a situation that has its drawbacks; for it was not long ago that the mill was swept away by a snow-slide. The past year has been a successful one, and profits amounting to £267,700 have been earned, out of which the shareholders have been paid, in four quarterly dividends, £164,000, and T. F. Walsh, the original vendor of the mine, has received £69,853, being 25 per cent. of the net proceeds for the year.

The most important portion of the report is that which discusses the development, and in this respect it is not of a favorable character. The deepest workings have not opened up ore similar to that in the upper levels, and it looks as if the life of the mine must be a short one unless fresh orebodies are met with. In order that the subject should be scientifically treated, the directors have instructed J. E. Spurr, formerly of the United States Geological Survey, to make a complete geological report on the company's property, a measure which other mines, where the geology is complicated, might well follow.

Mining News from All Parts of the World

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

THE CURRENT HISTORY OF MINING

Alabama

JEFFERSON COUNTY

Cahaba Coal Company—This company has bought 10,000 acres of coal land in Jefferson, Shelby, Tuscaloosa, and Bibb counties, and will develop the acquired properties on a large scale. This company already has a mine at Coalmont, with a daily output of 300 tons, which, in a few months, will have been increased to 550 tons. This mine is being fitted with compressed air and a new Montgomery coal washer is being erected.

Arizona

YAVAPAI COUNTY

Arizona Power Company—This company has been considerably delayed in its construction work during the past month on account of the high waters in the Verde river. About 300 men are employed at present.

Emporia Mines Company—This company, operating six miles south of Prescott, has its new shaft down 200 ft. on the lode. The whole shaft is in ore of a good milling grade. About 200 tons, taken out in sinking the shaft, are on the dump.

Verde River Power Company—This company owns water rights on the Verde river below Fossil creek; measurements and determinations for a period of eight years give the minimum power to be obtained from the flow of waters at this point to be 2500 h.p. The company will begin work on the diversion dam and canals, and it is expected that the electric machinery will be running within 18 months.

Monica—The mines near Kirkland shipped two bars of bullion to the Prescott National Bank, the result of the July run, the assayed value being about \$16,000. The mines have been producing steadily for the past four months.

Big Stick Mining Company—It is reported that this company has made a discovery of high-grade ore in its mines near Hillside, but the extent has not been determined. The new mill will not be ready for operation before Jan. 1.

McCabe & Gladstone—These mines at McCabe have been leased and operations will be resumed within a short time. Engineers and mechanics are busy making needed repairs.

New England Arizona Gold and Copper Company—This company has resumed operation at its mines near McCabe. The mines are opened by a 300-ft. shaft and

considerable ore has been exposed. The operations are under the supervision of J. H. Farrell.

Octave—The company has had shipped to Wickenburg, the site of its new power plant, a 24x42-in. Hamilton Corliss engine, and other machinery will arrive shortly. The plant is to be in operation by January next.

California

AMADOR COUNTY

Central Eureka—Men have been put at work in this mine, Sutter Creek, repairing the shaft.

South Eureka Mining Company—This property at Sutter Creek is yielding more rock than can be crushed in its 20-stamp mill, and is building a cable tramway to take the ore to the 20-stamp mill of the Central Eureka until the latter mine needs it for itself.

CALAVERAS COUNTY

Billy Williams—This mine at West Point, idle for 25 years, is being reopened by Thos. Jenkins, one of the owners.

Mohawk—J. F. Buyck is cleaning out the shaft of this mine, near Railroad Flat, and will sink it deeper.

Newman—Levaggi & Co. have two shifts at work on this mine, near West Point, opening it up and cleaning up the shafts and tunnels. There is a 10-stamp mill on the mine.

Reiner Gravel—The gallows frame at this mine, near Angels, has been completed and the hoist installed, so that sinking on the three-compartment shaft will shortly begin.

EL DORADO COUNTY

Alpine—At this mine, on the Georgetown divide, the new steam-hoisting and pumping plant is nearly completed. The water-power compressor is furnishing air for the drills in the shaft.

Sherman—The installation of the new 10-stamp mill on this mine, near Placerville, Thos. Clark, manager, is virtually completed.

INYO COUNTY

Four Metals Mining Company—This company has been notified by the forest ranger that work on the power-house in Lone Pine creek can be commenced, so the machinery will be installed as soon as possible.

MARIPOSA COUNTY

Baucroft—This mine at Hornitos is having an electric-power plant installed, the power coming from Merced Falls.

Belladonna Mining and Milling Company—This company has been organized to work mines in the Sweetwater creek in Jerseydale district. B. L. Richards is president.

Egenhoff—This property has passed into the hands of C. L. Morrell and R. L. King, of Merced. There is a group of 10 claims between the Hites Cove and Ferguson mines. The best ore thus far found is the Clearing House claim.

NEVADA COUNTY

South Yuba—This company, T. M. Chase, superintendent, is now operating the South Yuba, Eagle Bird and Gray Eagle mines at Washington. Additional equipment is being installed, and a new flume has been built to bring water to the Eagle Bird and Yuba mines. The 30-stamp mill of the South Yuba is running day and night. Both the South Yuba and Eagle Bird were formerly producers.

PLACER COUNTY

Bellevue—P. Lozano has bonded the mine at Ophir and will run it on royalty. About 15 men will be interested in working the mine.

Piazzoni—D. M. Harvey is working this mine at Seneca, and recently discovered high-grade ore in a wide ledge in the shaft which is being sunk.

SAN BERNARDINO COUNTY

Orange Blossom Extension—The new mill on this property, nine miles from Barstow, owned by San Diego men, has been started up on ore averaging \$16 per ton.

SAN DIEGO COUNTY

E. C. Silhite, of Riverside, is forming a company to work a new mining property east of Descanso, and a few miles south of the Noble mines. There is plenty of water near the mine.

Escondido Mine Development Company—This company has acquired the claims of the Asmus company, near Escondido, and will develop them.

SHASTA COUNTY

Black Tom—The Niagara mine, at French Gulch, now being operated by this company, was recently equipped with a new mill.

Mammoth—At this copper property, Kennett, the big compressor has a capacity

to furnish power to 120 three-inch drills, but about 30 machines are now in operation. This mine is now consuming about 1000 h.p. in electrical energy. The company is about to prospect with a diamond drill the Rainbow mine, near Sisson, to learn the size of the orebody.

SIERRA COUNTY

Alleghany—A San José company has an option on part of this property, and F. G. Frymire has been appointed superintendent in place of W. W. Tiner, who has resigned.

Dreadnaught—In cleaning out the old works of this mine on Kanaka ridge, F. B. McLaughlin has encountered high-grade quartz.

Alaska Mining Company—This company, at Pike City, has let a contract to sink the shaft 300 ft. deeper, the water being for the present under control.

Crocus—This company has about 60 men at work on surface improvements and underground development. N. W. Mather is manager.

SISKIYOU COUNTY

Big Cliff Group—The deal between Wintering & Osgood and the U. S. & B. C. Mining Company for the purchase of this property on Russian creek, has been declared off, but other parties stand ready to take the mine on the same terms.

Stirling—The Rose City company has purchased this mine on Hungry creek, near Hornbrook, and men have been set at work. The mill and cyanide plant are almost completed.

TEHAMA COUNTY

Rustler and Oom Paul—Coleman & Kuchner, of Red Bluff, have purchased three quartz mines in the Flat Creek district. They have been under bond and development for a year past.

TULARE COUNTY

Arc Light Mining Company—There has been a recent change of ownership and management in this company, whose mines are near the headquarters of Kings river, and shaft sinking has been resumed, preparatory to putting in machinery.

TUOLUMNE COUNTY.

Altadena—Deeds have passed transferring this property from the old company to W. T. Turner of Santa Clara.

Drcisam—This mine, recently bonded to the Parlin Mining Company of Los Angeles, is to have its shaft deepened 300 ft., to 700 ft. in all. An air compressor is being installed. Ten stamps are to be added to the mill.

H. T. & H. S. Clark have sold to Pray & Coburn 285 acres of mining ground near the Keltz mine for \$15,000, to be paid in installments.

Confidence—At this mine a new electric motor is being installed to run the com-

pressor and hoist, and the mine will shortly be started up again.

Colorado

GUNNISON COUNTY

Green Cañon Coal Company—This company is pushing development work on the tract of 280 acres of land which it recently purchased. The land is on Ohio creek, 19 miles northeast of Gunnison, and is close to railroad transportation.

LAKE COUNTY—LEADVILLE

Several mine managers are experimenting with cement supports to take the place of timber. Wood is becoming so scarce in this section that the managers have to do something. So far, the cement has proved satisfactory.

Big Six—This property, Breece hill, is shipping 30 tons daily of a good grade of lead ore which carries fair values in gold and silver. The body of ore is now well developed and shipments are regular.

Dinero Tunnel—The bore has reached to within a few feet of the veins, but as they dip to the west, the tunnel will probably have to be driven another 50 ft. before they are cut. The breast of the tunnel is in a mineralized formation.

Fanny Rawlings—The lessees on this property, Breece hill, are carrying on considerable development, in addition to shipping 30 tons daily of high-grade ore. The old shaft is being sunk deeper.

Iron Silver Mining Company—It is very likely that work will be resumed on the Tucson and Moyer mines at an early date. A contract has been let for the erection of a \$12,000 ore-house at the Tucson. All of the mines are now equipped with electrical power.

Long & Derry—In this mine, on the hill of the same name, a good body of ore has been cut on the tunnel level, and shipments, it is said, will be started within a few days. The ore carries gold and silver.

Ruby—A. S. Sharp has secured a lease on this property, Weston pass, and is making preparations to resume operations and keep at work during the coming winter. In the lower workings of the mine, there is a large body of lead ore carrying fair values in silver.

South Mosquito—A great deal of attention is being paid to this section of the district and a number of properties are being worked in the neighborhood of Corinne mountain. Among them are the Oil City, Genevieve, Mohawk and Maumee. The principal value in all of these properties is gold.

OURAY COUNTY

Camp Bird, Ltd.—The report sent out from the London office for the month of July, shows that the mill ran 30 days, crushing 6810 dry tons of ore, and producing 7404 oz. bullion and 461 tons of

concentrates. Receipts from bullion and concentrates sold were \$165,546; expenses, \$46,849; net earnings, \$118,697. London expenses were \$1500, leaving \$117,197 net. Expenditures on construction were \$739. There was 137 ft. development work done.

Idaho

LEMHI COUNTY

Napias Placer Mining Company—Control of about four miles of the upper part of Napias creek has been secured. Most of this stretch is almost level; only enough work has been done to demonstrate the richness of the ground. After having thoroughly tested the property, the company is now taking steps toward the installation of a dredge. The gravel is easy to handle, being practically free from clay and other unfavorable properties. One dredge, that of a private concern on Moose creek, three miles north of Napias creek, is already in operation in this district.

SHOSHONE COUNTY

Anchor—Sinking is about to be resumed on this property at Burke, on which the recent sensational strike of silver ore was made. The mine was closed down temporarily pending the installation of electric power for the compressor, which had previously been driven by steam. It is intended to sink the present shaft to a greater depth and then to drift on the lead.

West Hecla—A contract for 300 ft. of tunnel work has been let to James Backlund. The adit has already been driven about 1000 ft., but it is calculated that it will have to be carried from 150 to 200 ft. farther to tap the main lead. Arrangements will be made in the near future for the installation of six drills.

Clearwater—Excellent reports continue to come in regarding this property in the Clearwater district. A large amount of machinery has been installed, and work is about to commence on a double-compartment winze to be sunk from the lowest tunnel. This property has been developed by means of three tunnels, in all of which a good showing of ore has been made.

Hecla—The regular monthly dividend has been doubled. For some time past the company has been paying at the rate of a cent a share, but the dividend just declared for the month of August is at the rate of two cents, and involves the disbursement of \$20,000. The total disbursement for this year is \$90,000, and the grand total paid by the company, \$1,610,000.

Stewart—E. J. Carter, one of the heaviest stockholders, has made the announcement that the affairs of the company, which have been tangled by legal complications, are about to be straightened out and operation of the mill and mine re-

sumed in the near future. The mill is practically new, and has a capacity of about 150 tons a day. Big bodies of ore have been opened in the property, and just after the completion of the mill several shipments were made to the East Helena smelter of the American Smelting and Refining Company.

Indiana

BLACKFORD COUNTY

Montpelier Mining Company—This company has been incorporated for the purpose of mining gold, silver, zinc, lead and other minerals or ores in the United States. A branch office will be maintained in Montpelier and the principal office in Joplin, Mo., where mining operations will first be begun. H. P. Malone, W. H. Martin, B. F. McClain and C. E. Hart, directors.

CLARK COUNTY

Apex Mining Company—This company has been incorporated with headquarters in Jeffersonville. The company will do a general mining business in Indiana and other States. James H. Duffey, R. E. Cook, and J. A. McKee, directors.

GREENE COUNTY

Enterprise Coal Mining Company—This is the name of a new company incorporated Aug. 26. The company will carry on the business of mining coal in Greene and adjacent counties. The directors are Frank Ivy, Sr., Chas. Vaughn, Henry A. Maddox and W. R. Abrams.

Maryland

ALEGHANY COUNTY

Consolidation Coal Company—This company is working all of its mines in the George's creek region on full time. The output at present averages over 5000 tons daily. Although some of the other companies are not yet working full time, late reports from the region show a decided increase in output during the past few weeks.

Missouri

STODDARD COUNTY

Puxico Mining Company—This company is preparing to open up and develop an iron-ore property at Puxico, on the line of the St. Louis & San Francisco railroad. A crushing and washing plant has been erected, and work is in progress on the mine. Otto Riesenweber, of Menasha, Wis., is at the head of the company.

Montana

BUTTE DISTRICT

Butte-Montana—Word has been received from New York that the option, secured by F. E. Slump about two months ago on the controlling interest in the stock of the Butte-Montana company, has been taken up. It is expected that work on

the company's property will be resumed within a few weeks.

British-Butte—A pit 150x150x9 ft. has been completed and is ready for the installation of the new \$70,000 Risdon gold dredge. Three dams have been completed capable of storing 10,000,000 gal. of water. From the lowest of these dams a 1600-ft. wooden flume runs to the pit. The company has this week closed a contract with the Butte Electric Company for power supply for five years. Each dredge will require 300 h.p. for operation, and will have a capacity of 2500 cu.yd. per day. Five carloads of lumber and one of machinery have arrived this week and construction work is progressing rapidly.

Boston & Montana—Officials of the company expect the Great Falls smelter to resume operations on Sept. 1. When the smelter is opened, the Boston & Montana mines, some of which have been shut down completely and all of which have been producing at a reduced scale, will be operated to their full capacity.

Red Metal—At the Belmont mine the shaft is being enlarged to standard three-compartment size and is also being retimbered. When the retimbering has been completed a large engine and boiler plant will be installed. The Belmont has been connected with the Anaconda mine by crosscut, and much of the ore now hoisted at the latter shaft will be taken out through the new Belmont shaft.

Farrell—The National Mining and Investment Company, of Butte, has secured an option on a controlling interest in the stock of the Farrell Copper Company. The company's properties are situated in the southern part of the Butte copper district.

JEFFERSON COUNTY

Boston-Corbin—Development work is being carried on in the 500-ft. level at this property.

Robert Emmet—A new 125-h.p. electric hoist and a new 125-h.p. electrically-driven compressor have been installed. Drifting on the vein on the 250-ft. level is now in progress. Several encouraging ore shipments from the upper levels have been made by leasers.

Comet—The old Comet mine, situated two miles from Basin, belongs to the Montana Consolidated Mining Company. A 150-ton mill is operated at the property. The ore carries gold, copper, silver, lead and some zinc, and it is with the idea of making a complete separation of the several minerals that experiments are now being carried on in the mill.

FERGUS COUNTY

Barnes-King—The operations of the company for the month of July resulted in a net earning of \$5000.

Nevada

ESMERALDA COUNTY—GOLDFIELD

The week's production, valued at

\$231,520, was 2941 tons. The Combination mill treated 630 tons from the Consolidated mines. The Nevada Goldfield Reduction company treated 370 tons from Engineers Lease; 82 from Mohawk Jumbo; 372 from the Combination Fraction; 235 from Frances Mohawk; 15 from New Western; 71 from Little Florence; 75 from Mohawk Combination; 280 from Consolidated Red Top; 90 tons from Hayes lease. The Western Ore Purchasing Company handled from the Mohawk Jumbo, 563 tons; Baby Florence, 100 tons; Engineers Lease, 41 tons; Florence Consolidated, 17 tons.

Milltown Fraction—A new 20-h.p. hoist has been installed; the double-compartment shaft is 125 ft. deep. On account of the reported strike at the Yellow Tiger mine, a crosscut will be started toward the Tiger vein.

Combination Fraction—The output is about 55 tons per day. Owing to the amount of waste coming from the development work, this is all the ore that the hoist can handle. The ore hoisted averages \$80 per ton.

Little Florence Mining Company—In its lease on the Combination Fraction, this company has driven crosscuts, both east and west, for 520 ft., and has almost reached both sidelines. Several strong veins have been cut, which will now be prospected. On the 200-ft. level a drift has developed the main vein as far as the end-line of the Florence ground.

Consolidated Red Top—This company has supplied 280 tons of ore this week that averaged between \$60 and \$70 per ton.

Mohawk Jumbo—This lease is shipping daily 125 tons of ore assaying \$60 per ton; within two weeks this will be increased to 200 tons per day.

ESMERALDA COUNTY—RAWHIDE

There are 39 leases at Rawhide that have commercially valuable ore developed; 21 of these mines are shipping. The capacity of the local mills is too small to handle all milling ore being mined in the district. The plant of the Gates Tyrer people is being increased to a daily capacity of 120 tons. The Watt mill, having a capacity of 80 tons, will be running this month. The promoters of the camp's water-system are planning to erect a large custom mill; a mill is to be erected by Polachecy and associates, of Milwaukee, who own the rich Murray lease and the I. X. L. group of claims. The Rawhide Mining Company is preparing to erect a mill to treat its own ores and ores from the St. Ives lease on the property of the Rawhide Queen Mines Company. Two carloads of machinery for the 50-ton Truitt mill, which is to be erected on Walker river, have arrived at Schurz.

ESMERALDA COUNTY—MINA

Blue Light Copper Company—The shaft

at the mine is 700 ft. deep. The company has ordered a 100-h.p. hoist; this has already been shipped. R. S. Chalmers, who has been engaged in copper mining in Spain for several years will be in charge of the underground work.

NYE COUNTY—TONOPAH

The total output of the Tonopah mines for the week amounted to 6300 tons, worth \$165,550. Tonopah Extension mined 130 tons; MacNamara, 400; Tonopah Mining Company, 3430; Belmont, 1000; Montana-Tonopah, 950; Midway, 100; West End, 250; Jim Butler, 40 tons.

Tonopah Mining Company—The Mizpah shaft was sunk 16 ft. during the past week. It is now 1123½ ft. deep. The core-drill hole from the bottom of the Red Plume shaft is now 65 ft. below the 500-ft. level. The cores show that the rock passed through by the drill is a sulphide-bearing porphyry. Development work, amounting to 286 ft. was done during the week.

Jim Butler—This mine is again shipping ore; while the shipment will not be large, the company expects to make them regularly.

Tonopah Extension—The work of sampling the Tonopah Extension mine by Henry Krumb and his six assistants is progressing rapidly and will be finished within two weeks. The report will be ready for the stockholders at their adjourned meeting to be held in September. The regular mine work is not interrupted.

MacNamara—Work preparatory to opening up the ground just released from litigation is being pushed, and the pipeline for the three extra air-drills is being laid from the compressor of the Tonopah Extension Company. This week's shipment consisted of eight 50-ton cars, six cars to the company's mill and two cars to the smelter. Since Feb. 1 the Mac Namara mine has shipped seventy-two 50-ton cars from a portion of the vein about 200 ft. long on the 300-ft. level.

West End—This week's shipment was the largest in the history of the mine. Most of this ore came from the new find in the Corkill shaft.

Midway—On the 335-ft. level the face exposes a seam in the vein 1½ ft. wide, which shows much ruby and brittle silver.

Belmont—The work along the north side of the Mizpah fault is growing more encouraging. The face of the drift exposes 1½x2 ft. of good ore, and seems to be widening. The underhand stope from this level shows a vein 4 ft. wide of good sulphide ore.

Montana—The production of the mill was interfered with last week by electrical storms, which put the long-distance power line out of commission. The tonnage was 950 tons against an average of 1100 tons.

Tonopah Mining—Sinking continues in the Mizpah shaft, the bottom of which is

now 1107 ft. below the collar. It is going down at the rate of 3 ft. per day.

Ohio

Sunday Creek Company—This company operates coal mines in several counties on the line of the Hocking Valley railroad. The report for the year ended March 31, 1908, shows coal sales, \$4,465,432; coke sales, \$384,819; royalties, rentals, etc., \$258,008; total, \$5,108,359. Expenses were \$4,348,417; net earnings, \$759,942. Interest and other charges, including improvements, were \$1,013,657, showing a deficit of \$253,715 for the year. Coal sales were 3,933,286 tons, the average price realized being \$1.14, and the average cost \$0.95 per ton. Coke sales were 149,332 tons, at an average price of \$2.58; average cost, \$1.81 per ton.

Oklahoma

Hailey-Ola—About 30 miners were suffocated in mine No. 1, near Haileyville, 14 miles east of McAlester, on Aug. 26, when fire destroyed the hoisting and air shafts, cutting off all air from the men below. Exploration in the various chambers shows that none of the men met death by burning, but that all were suffocated.

Pennsylvania

ANTHRACITE

Lehigh Valley Coal Company—On Aug. 28, five men were killed and many injured by a runaway mine car which dashed down the slope at the Warrior Run colliery. The car collided with a car full of miners who were being pulled up the 2000-ft. incline.

Philadelphia & Reading Coal and Iron Company—This company's statement for July, the first month of its fiscal year, is as follows:

	1907.	1908.	Changes.
Earnings.....	\$2,956,139	\$1,954,764	D. \$1,001,375
Expenses.....	2,808,723	1,894,942	D. 913,781
Net earnings..	\$ 147,416	\$ 59,822	D. \$ 87,594

The tonnage and earnings in July were the lightest in a number of months.

Reading Coal and Iron—After several years of carefully conducted surveys and the location and putting down of an exact system of bore holes, the company has completed a thorough examination of the coal seams in the southern anthracite field, showing that the Mammoth bed, as well as all the other seams, so far worked in the vicinity of Pottsville and Shamokin, continue with undiminished thickness to the southern extremity of the field. This proves that the companies now operating have a solid seam of coal about 50 miles long and of uniform thickness and quality.

South Dakota

LAWRENCE COUNTY

Alder Creek—President Sandholm, of

Des Moines, Ia., has been here arranging for a resumption of work. It is planned to increase the capacity of the present 10-stamp mill as the orebodies are well opened up.

Gold Eagle—At the annual meeting the following officers were elected: President, A. M. Masters; vice-president, John S. Sheppard, secretary; G. M. Luttrell, all of Jacksonville, Ill. The company has just let contracts for more development work, and will put on a larger force of men.

Homestake—The new regrinding plant is now in commission and is crushing 200 tons daily, or less than half its total capacity. The plant regrinds the pulp as it comes from the stamp mills by means of a tube mill and Wheeler pans.

Reliance—The officers elected at the annual meeting are: President, S. F. Olson, Minneapolis, Minn.; vice-president, V. C. Wass, Dell Rapids, S. D.; secretary, F. W. Medbery; treasurer, E. Bennett, Lincoln, Neb. The new mill is now treating 175 tons daily.

PENNINGTON COUNTY

Black Tom—Work is being pushed in the drifts from the bottom of the 75-ft. shaft, where a fair grade orebody is being opened up.

Montezuma—A strike of free-milling gold ore has just been made in a drift and is being followed up. The ledge is 2 ft. wide.

Tennessee

HICKMAN COUNTY

Standard Phosphate and Chemical Company—This company has elected officers as follows: President, Edward A. Turner; treasurer, William E. Pierce; secretary, Edwin Nicodemus. The offices are in the Monadnock block, Chicago.

Virginia

LEE COUNTY

Kenvir Coal Company—This new company has bought the mine formerly operated by the Pennington Coal Company, and is planning to increase the output from 150 to 500 tons daily. James R. Calhoun, Pennington Gap, Va., is manager.

STAFFORD COUNTY

Austin Run Mining Company—This company is preparing to put in a power plant at its pyrites mine near Brooke, with steam hoist, air compressors and drills. The company's office is at 507 Harrison building, Philadelphia.

West Virginia

HARRISON COUNTY

Judge Dayton, of the Federal Court, has appointed A. C. Fulmer, of Morgantown, receiver for the Janelew Coal and Coke Company at Janelew, on application

of the original owners in Pennsylvania, who claim that the company owes them over \$8000. Circuit Judge E. C. Lynch has also issued an injunction restraining the Janelew company from mining or removing any coal. Failure to satisfy a vendor's loan of \$30,000 is charged, and is responsible for the action of Judge Lynch.

OHIO COUNTY

The Riverside department of the National Tube Company has made arrangements to commence at once extensive improvements at the Semet-Solvay coke works, on which about \$50,000 are to be expended. The coal-crushing department is the principal feature of the improvements and will be an innovation at the plant.

Canada

ONTARIO—COBALT DISTRICT

Ore Shipments—Shipments of ore from Cobalt for the week ended Aug. 22 were: Crown Reserve, 54,000 lb.; Drummond, 61,400; La Rose, 244,000; Nipissing, 63,700; O'Brien, 192,180; Right of Way, 124,080; Silver Queen, 80,000; Hudson Bay, 62,000; Trethewey, 125,870; Watt, 60,100; total, 1,007,330 pounds.

Gates—At this mine, Montreal river, a promising lode of silver has been struck near the surface. The shaft is now down 86 ft., and 100 ft. of drifting has been done. Ore of shipping quality is being taken out.

ONTARIO—MANITOU LAKE DISTRICT

Laurentian—At this mine, Manitou lake, the vein has been cut on the 400-ft. level, showing free gold.

ONTARIO—HALDIMAND COUNTY

The Lawlor company, the Erie company, and several smaller concerns interested in the Selkirk natural-gas district, have sold their interests for \$150,000 to the Consumers' Gas Company, of Hamilton, Ontario.

ONTARIO—TILBURY OILFIELD

Boston & International Oil Company—This company, one of the largest operating in the Tilbury oilfield, the head office of which is in Boston, has made an assignment to G. W. Sulman for the benefit of creditors.

YUKON TERRITORY

Yukon Basin Gold Dredging Company—William Ogilvie, president of this company, has arrived in the Yukon and started with the first dredge up the Stewart river where it will go into operation. A second large dredge is expected to be put in commission later, and a third is projected for next season. The company is largely backed by Kansas City capitalists, and has secured 110 miles of dredging ground.

Mexico CHIHUAHUA

Bullion Shipments—The Chihuahua branch of the Banco Minero acknowledges receipt of the following bulletin product for the week ending August 23: Batopilas Mining Company, 89 bars silver, value 98,500 pesos; Watterson Gold Mining Company, 11 bars gold-silver, value 28,600 pesos; Lluvio de Oro, gold-silver, 6000 pesos. The Rio de Plata also marketed through this same institution 397 sacks of concentrates valued at 49,000 pesos. There were also several other small shipments of bullion and high-grade concentrates, the exact amount of which is not recorded.

Parral Output—The production of the Parral camp for the week ending August 15, amounted to 8420 tons, of which 5040 tons were locally treated and the remainder sent to outside smelters.

Minas Tecolotes y Anexas—These properties, owned by the American Smelters' Securities Company, in the Parral camp, are making a good record. About 600 tons are being put through the remodeled milling plant daily, and about 100 tons of gold- and silver-carrying lead concentrates is the output. In addition, 50 tons of crude ore is shipped daily. The large gas-producer plant is giving satisfaction. It is stated that installations of zinc works and an aerial tram are planned. W. Maynard Drury is the manager in charge.

Sahuayacan Mining Company—Mining and milling operations are to be increased at this company's properties in the Ocampo section. The general manager, Geo. E. Howard, accompanied by P. A. Shanor and C. W. Smith, Pittsburg stockholders, is now at the mine.

San Patricio—This property in the Parral camp, operated by F. S. & A. E. Robertson is on the producing list in a small way. A continuous and increased output is assured.

Mexican Midland—This company, of which D. M. Evans is general manager, has begun grading for a 25-m. railroad from a point on the Orient railroad, east of Chihuahua, to its developing properties in the Choreros mountains.

San Martin—This company with property in the Uruachic section is building a roaster for treating the concentrates before delivery to the wood-burning reverberatories. The mill lately completed, has been put in successful operation by Thomas Caine. The company's general manager is temporarily at Chihuahua.

Greene Gold-Silver—It is reported that this company has finally paid almost in full all of its labor claims at Concheña and Ocampo, and that, with the early return of Col. W. C. Greene from Japan, the rumored reorganization of its affairs will be carried through. The reorganization of the Sierra Madre Land and Lum-

ber Company, is also said to be under way.

San Toy—This company is sending out daily from its Santa Eulalia mines about 150 tons, but it is the plan to increase this output shortly.

GUANAJUATO

Production—There was a decided increase in shipments of bullion and concentrates from this district for the week ending Aug. 22. The bullion production showed an increase of \$12,000, and concentrates \$6,500. The total value of the week's shipments was \$275,000, the largest week's output thus far this year. The bullion went to the refinery at Mexico, and the Government mint, and the concentrates to the smelter at Aguascalientes.

Peregrina—This company has purchased from the Westinghouse Electric and Manufacturing Company, an electric locomotive, which will be used to haul its ores between the mine and mill, a distance of about one mile. With this locomotive will be supplied a complete equipment consisting of a motor-generator set to convert the alternating current supplied by the Guanajuato Power and Electric Company, to a direct current, and controlling apparatus.

VERA CRUZ

Gusher Fire Quenched—Late press despatches from Mexico announce that the firm of S. Pearson & Sons has gained control of the burning oil well at Dos Bocas, near Tampico. It is estimated that fully 3,000,000 bbl. of oil has been destroyed. The oil is still flowing and is being stored in a great reservoir.

Europe

ENGLAND

Colliery Disaster—An explosion and fire, in which it is feared 76 men have lost their lives, occurred on Aug. 18, at the Maypole colliery, at Abram, near Wigan, Lancashire. The explosion wrecked the upcast shaft, and only three men were brought out alive. The pit took fire and the officials decided to flood the mine. About 500 men and boys had come up at the end of their shift a few hours before the accident.

Africa

PORTUGUESE EAST AFRICA

Some mining work is reported in the Missale goldfield, where three companies are operating, two Portuguese and one British. The British company has advanced far enough to put up a small mill. The results have not been reported. A wagon road is being built from Tete to Missale, 230 miles. In the Chifumbase goldfield a German company is operating, and has recently put up a five-stamp mill. A Portuguese company recently began work on a copper vein discovered some time ago near Tete, and has shipped some ore to Swansea.

Metal, Mineral, Coal and Stock Markets

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

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, Sept. 2—Coal trade in the West shows no appreciable change from last reports. The demand for steam coal increases slowly, and a few more mines are reported at work. The growth is slow, however, and only the fact that some gain is going on can be considered favorable. Lake trade has been somewhat interrupted by congestion at the receiving ports, but this will probably soon disappear.

In the South the Alabama strike has been declared off. The reason given by the officers of the miners' union is, substantially, that there is no hope of success under present conditions of compulsion by the State authorities. The facts seem to be that the strikers had so alienated public opinion by their violence, that almost the whole community had turned against them. The operators seem to have secured a complete victory for the present.

In the East the Seaboard bituminous trade is reviving a little, and prospects are better than for some time past. The anthracite trade is dull and quiet.

COAL TRAFFIC NOTES

Tonnage originating on Pennsylvania railroad lines east of Pittsburg and Erie, year to Aug. 22, in short tons:

	1907.	1908.	Changes.
Anthracite.....	3,640,086	3,263,180	D. 376,906
Bituminous.....	21,711,096	20,733,863	D. 977,233
Coke.....	9,040,493	4,330,501	D. 4,709,992
Total.....	37,391,675	28,327,544	D. 9,064,131

Total decrease this year to date was 24.2 per cent.

Coal and coke tonnage of Chesapeake & Ohio Railway, year ended June 30, short tons:

	Coal.	Coke.	Total.
New River.....	5,659,408	198,735	5,858,143
Kanawha.....	4,427,420	80,569	4,507,989
Kentucky.....	267,038	.....	267,038
Connecting lines.....	171,516	51,587	223,103
Total.....	10,525,382	330,891	10,856,273
Total, 1907.....	9,929,583	328,760	10,258,343

Deliveries for the past year: Points west of mines, 5,054,916 tons coal and 203,471 coke; points east, 1,543,604 tons coal and 127,420 coke; tidewater, 3,822,919 tons coal; anthracite to line points, 22,404 tons. Increase last year in total tonnage, 597,930 tons, or 5.8 per cent.

Coal receipts at St. Louis, six months ended June 30, were 3,668,022 short tons in 1907, and 3,113,227 in 1908; decrease, 554,795 tons.

Coal tonnage of roads in Ohio Coal

Traffic Association, six months ended June 30, short tons:

	1907.	1908.	Changes.
Hocking Valley.....	1,797,673	1,103,190	D. 694,483
Toledo & Ohio Cent..	820,504	498,056	D. 322,448
Baltimore & Ohio...	1,059,118	668,101	D. 391,017
Wheeling & L. Erie.	1,708,146	1,243,275	D. 464,871
Cleve., Lorain & Wh.	1,368,583	1,129,777	D. 238,806
Zanesville & Western	772,446	485,121	D. 287,325
Toledo Div., Pen. Co.	1,215,947	750,696	D. 465,251
L. Erie, Alliance & Wh.	608,668	440,272	D. 168,396
Marietta, Col. & Cleve.	11,327	25,111	I. 13,784
Total.....	9,362,152	6,343,589	D. 3,018,563

The total decrease shown this year is 32.2 per cent.

Coastwise shipments of coal from Seattle and Tacoma, Wash., six months ended June 30, were 359,889 short tons in 1907, and 307,014 in 1908; decrease, 52,875 tons.

New York

ANTHRACITE

Sept. 2—Anthracite trade continues dull, and the companies are generally curtailing production. A number of collieries are reported as running only three days a week, and others have been shut down for an indefinite period. Prepared sizes are in good supply, but steam sizes are a little scarce, owing to decreased production.

The summer discounts came to an end Sept. 1. Prices are now \$4.75 for broken, and \$5 for egg, stove and chestnut. Steam size prices are unchanged: Pea, \$3.25@3.50; buckwheat, \$2.35@2.50; buckwheat No. 2, or rice, \$1.60@2; barley, \$1.35@1.50. All prices are f.o.b. New York harbor points.

BITUMINOUS

The Seaboard bituminous trade is still irregular, improvement coming in spots, to be followed by dullness. Eastern shipments show some improvement, and more is to be expected as the time for putting in supplies grows shorter. Some inquiries have been coming from Sound points, where no business has been done for some time.

New York harbor trade is dull. Ordinary grades of Clearfield are selling for \$2.40; better grades at \$2.50@2.60. All-rail trade is quiet. Cars are in good supply, and transportation is about up to schedule.

Coastwise trade shows an improvement and vessel-owners are asking in some cases 5c. more. Rates for large vessels from Philadelphia are: Boston, Salem and Portland, 50@55c.; Lynn, 60@65c.; Newburyport, Gardner and Bangor, 70@75c.; Portsmouth, 55@60c.; Bath, 65@75c.; Providence, New Bedford and the

Sound, 50c. From New York harbor ports 50c. is asked to Boston and Portland.

Birmingham

Aug. 31—Alabama coal production will show a decided falling off this year as compared to last. The strike of the union miners has had its effect. Some of the commercial coal mines have done nothing since July 1. The larger corporations have been experiencing much trouble in bringing new men in and protecting them from the intimidation of the strikers. The coke supplies in this State have been off considerably. There is a good market for coal. When the operations in this State once more become normal, all the business wanted can be secured by producers.

Latest advices are that the strike has been called off.

Chicago

Aug. 31—The coal market continues depressed, but there are a few minor features of improvement—the beginning of the domestic trade to the far-sighted element of consumers, the strengthening of Eastern coals through better demand and better regulated shipments, and the turning of the steam trade toward run-of-mine in the market for Western coals. Steam sales are no better as a whole.

Illinois and Indiana lump and egg sell for \$1.75@2.35, the demand being light; run-of-mine brings \$1.65@1.75 and screenings sell for \$1.35@1.55, these prices being for car lots.

Smokeless has better sales and prices are firmer, the circular quotation of \$3.30 on run-of-mine being shaded but slightly. Hocking is firm, with supplies not in excess of demand, and sells for \$3.15. Youghiogeny moves chiefly on contracts, at \$3.15 per steam and \$3.25 for 3/4-in. gas. Anthracite is not yet active but sales increase slightly.

Indianapolis

Sept. 1—General good humor prevails throughout the mining districts among miners and operators except at the Hudson mine, where the miners have been ostracized by President Lewis who forfeited the charter of the local union because they refused to return to work pending an adjustment of the cause of the strike. President Lewis is highly complimented because of his policy of making the agreements between the miners and operators binding, and his support of the provision for a continuation of work

while pending difficulties are being adjusted.

The Vandalia Coal Company has reopened No. 9 Mine, giving employment to 300 men. By the end of the month all the mines of the State will be opened and a general resumption of business will be commenced.

Pittsburg

Sept. 1.—As predicted last week a number of coal mines in the Pittsburg district have been forced to close owing to the congested condition at Lake docks. It is estimated today that the railroad mines are not operating to more than 50 per cent. of the capacity and most of the river mines are down. Despite this condition large operators continue to quote prices on the basis of \$1.15 a ton for mine-run coal at mine.

Connellsville Coke—Additional contracts for coke continue to be placed, but not in large tonnages. Most of the business booked on contract ranged from 2000 to 5000 tons and prices are firm on the quotations made during the past month, \$1.65@1.75 for furnace and \$2.10@2.25 for foundry at ovens. For spot shipment some low prices are reported. The *Courier* in its summary for the week gives the production in both Connellsville fields at 196,144 tons. Shipments, 7641 cars as follows: To Pittsburg, 3142; to points west of Connellsville, 4059; to points east of Connellsville, 440 cars.

Foreign Coal Trade

French Coal Trade—Imports and exports of coal in France, six months ended June 30, metric tons:

Imports:	1907.	1908.	Changes.
Coal.....	7,333,710	7,321,410	D. 12,300
Coke.....	1,066,790	941,280	D. 125,51
Briquets.....	324,340	462,890	I. 138,65
Exports:			
Coal.....	593,800	545,440	D. 48,360
Coke.....	70,600	58,380	D. 12,220
Briquets.....	44,190	59,250	I. 15,060

Exports this year included 59,930 tons coal and 26,980 tons briquets furnished to steamships in foreign trade.

British Coal Exports—Exports of coal from Great Britain, with coal supplied to steamers in foreign trade, seven months ended July 31, long tons:

	1907.	1908.	Changes.
Coal.....	35,774,437	35,899,500	I. 125,063
Coke.....	505,968	595,429	I. 89,461
Briquets.....	850,565	912,448	I. 61,883
Total exports.....	37,130,970	37,407,377	I. 276,407
Steamer coal.....	10,755,349	11,141,974	I. 386,625
Total.....	47,886,319	48,549,351	I. 663,032

The larger exports were to France, Germany, Russia, Italy and Sweden.

Welsh Coal Market—Messrs. Hull, Blyth & Co., London and Cardiff, report prices of Welsh coal as follows, on Aug. 22: Best Welsh steam, \$3.06; seconds, \$3.78; thirds, \$3.48; dry coals, \$3.72; best Monmouthshire, \$3.54; seconds, \$3.30; best small steam, \$2.28; seconds, \$2.98. All per long ton, f.o.b. shipping port.

Iron Trade Review

New York, Sept. 2—A moderate increase in activity is apparent in the iron and steel markets. In pig iron there have been considerable sales of foundry iron in the East, with some basic. Furnaces seem less inclined to make concessions, though the large idle capacity is a weight on the market. Southern iron continues firm.

In finished material a few railroad orders for cars and bridges are coming forward. Otherwise railroad orders are still small. The car orders will make some demand for plates. Negotiations for structural contracts are more in evidence, and it seems probable that a number of orders will be placed before long. This number would be largely increased if the price question were settled, but that is still a factor against activity.

There are increasing reports of concessions in prices made to secure orders. It is not easy to follow these up, but there is no doubt that such concessions have been made. In light rails, for which there is quite a demand, cuts have been openly made, and most of the business is going to the outside mills.

Steel bars and sheets show a better trade than for some time. The demand for pipe is also reported on the increase.

Baltimore

Sept. 1.—Exports for the week included 1,706,843 lb. tin scrap to Rotterdam and 1002 tons steel rails to Glasgow. Imports included 246 tons ferromanganese from Germany and 5800 tons iron ore from Cuba.

Birmingham

Aug.—The month of August has been a satisfactory one with the Southern pig iron and steel producers. The aggregate business transacted has been good and quotations have been taking on strength. The quotations are now between \$12 and \$13 per ton, No. 2 foundry, with the latter price common. The make is holding up well. The accumulated iron in yards has been worked down well. The home consumption is good. The trouble in the coalfields during the past two weeks retarded improvement. There have been some few sales made for delivery during the first quarter of 1909.

The demand for steel, in all shapes, continues good and the plant of the Tennessee Coal, Iron & Railroad Company at Ensley, is losing no time. The month's record is the best since the plant was established. The improvements made this year have been showing results.

Chicago

Sept. 1.—Sales of pig iron continue to be of small lots, with no great aggregate tonnage. Furnace agents are making an effort to hold to \$13, Birmingham, for

No. 2 (\$17.35, Chicago), but the price runs down to \$12.50 on the more favorable sales. Northern holds well to \$17 minimum because of restricted output. Lake Superior charcoal is steady at \$19.50@20.

These prices apply on third- and fourth-quarter business, with many furnaces sold out for the third quarter. Selling agents are reluctant to enter into contracts for 1909 delivery to any extent. Foundries are still running light on their requirements, hand-to-mouth buying being favored by most melters.

Coke is in fair demand, with a good regulation of supply and \$4.90 standard for first-class Connellsville.

Philadelphia

Sept. 2—A better tone of the pig-iron market has developed within a few days, particularly in foundry irons, growing out of second or supplemental order from buyers who made overcautious purchases a month ago. There are also more inquiries, some of which relate to deliveries early next year, but no orders for such delivery have, so far as known, been definitely placed. Consumption of pig is heavier and more foundry work is coming in. Forge does not participate and negotiations for basic pig drag. For No. 2X \$16 is the prevailing price; gray forge is quoted today at \$16; basic nominally \$16.

Steel Billets—A resumption of work calling for billets is promised in a short time.

Bars—Some mills are getting business that will necessitate a larger output. Manufacturers take a discouraging view as to better prices.

Merchant Steel—A further improvement is claimed this past week. Small shops are more active.

Pipes and Tubes—Pipe work is promised, though no inquiries have reached the mills. Cast pipe is active and many small orders have been booked. Tubes are dull.

Structural Material—Our local business is unimportant. Recent building permits point to late autumn and winter construction which will probably absorb some material.

Old Material—All railway scrap of every description is held high. Very little scrap of any kind is selling. The yard men are not buying any more than they can turn over for cash.

Pittsburg

Sept. 1.—The pig-iron market is extremely dull. In finished steel products there is a continuance of the moderate scattered buying, which has characterized July and August, and which enables the mills to run at between 50 and 60 per cent. of their capacity, on an average. Most of the steel interests find that their

August business was slightly in excess of July. It seems to be accepted now, however, that there is no probability of any great increase in business this year.

The pipe mills have increased more in activity since July 1 than have any other class of mills, and are now reported to be operating, in each instance, at between 65 and 75 per cent. of full. Tinplate operations are steadily decreasing. Tinplate production in July and August broke all records for these months, when ordinarily most of the mills close. This was not due to heavy demand, but to the fact that the tinplate was bought and made late, the mills running very light early in the year.

Pig Iron—Transactions have been very light. A sale of 200 tons of No. 2 foundry was made this week to a Ford City interest, the Valley price of \$14.50, furnace, being beaten as the seller has a lower freight than the Valleys. While Bessemer is still quoted at \$15.25, Valley, there is an inquiry for 1000 tons from a new Pittsburg consumer, and it is possible that \$15 will be done. Basic is still quoted at \$14.50, Valley, and forge at \$13.75. The settlement of the Southern coal strike this week forestalls a demand for Northern iron, which was expected if the Southern strike continued much longer.

Steel—The market continues quiet, the regular price of billets remaining at \$25, Pittsburg. The Republic Iron and Steel Company is operating its bessemer-steel plant at Youngstown this week. Plates are 1.60c. and steel bars 1.40c.

Sheets—The market remains at 2.50c. for black and 3.55c. for galvanized, No. 28 gage.

Ferro-Manganese—The market is dull. A single carload went at \$43, seaboard, or \$44.95, Pittsburg. Forward delivery is \$1 lower.

Foreign Iron Trade

German Iron Production—The German Iron and Steel Union reports pig-iron production in Germany in July at 1,010,770 metric tons, being 54,345 tons more than in June. For the seven months ended July 31 the make was, in metric tons:

	1907.	1908.	Changes.
Foundry iron	1,278,874	1,308,453	I. 29,579
Forge iron	461,016	407,519	D. 53,497
Steel pig	593,903	570,807	D. 23,096
Bessemer pig	277,689	241,213	D. 36,456
Thomas(basic)pig	4,868,457	4,532,499	D. 335,958
Total	7,479,919	7,060,491	D. 419,428

Steel pig includes spiegeleisen, ferro-manganese, ferrosilicon and all similar alloys. The total decrease this year was 5.6 per cent.

Belgian Iron Production—The production of pig iron in Belgium in July was 102,890 metric tons, a decrease of 17,040 tons from last year. There were 31 furnaces in blast this year.

Metal Market

Gold and Silver Exports and Imports

NEW YORK, Sept. 2.
At all U. S. Ports in July and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
July 1908..	\$ 4,845,272	\$ 2,916,408	Exp. \$ 1,928,864
" 1907..	7,478,366	3,410,782	" 4,067,584
Year 1908..	58,363,247	29,324,304	" 29,038,943
" 1907..	43,779,098	24,879,429	" 18,899,669
Silver:			
July 1908..	4,930,746	2,982,074	Exp. 1,948,672
" 1907..	5,955,042	3,387,225	" 2,567,817
Year 1908..	30,445,291	24,128,422	" 6,321,869
" 1907..	35,174,251	25,782,836	" 9,391,415

Exports of specie from New York, week ended Aug. 29: Gold, none; silver, \$729,792, chiefly to London and Paris. Imports: Gold, \$192,834; silver, \$97,693, both from the West Indies, Central and South America.

Specie holdings of the leading banks of the world, Aug. 29, are reported, as below, in dollars:

	Gold.	Silver.	Total.
Aas'd New York	.....	.....	\$334,142,000
England	\$193,659,810	.....	193,659,810
France	645,214,425	\$177,825,890	823,040,315
Germany	207,140,000	85,845,000	292,985,000
Spain	78,470,000	153,820,000	232,290,000
Netherlands	38,528,500	20,821,000	59,349,500
Belgium	20,273,335	10,136,665	30,410,000
Italy	183,965,000	22,100,000	206,065,000
Russia	581,280,000	40,330,000	621,610,000
Aust.-Hungary	236,040,000	66,925,000	302,965,000
Sweden	20,325,000	.....	20,325,000
Norway	8,255,000	.....	8,255,000
Switzerland	23,160,000	.....	23,160,000

The New York banks do not separate gold and silver. The foreign statements are from the *Commercial and Financial Chronicle* of New York.

Gold and silver movement in Great Britain, seven months ended July 31:

	Imports.	Exports.	Excess.
Gold	\$27,801,277	£25,847,038	Imp. £ 1,954,239
Gold, 1907..	27,158,812	19,759,643	Imp. 7,399,169
Silver	6,106,868	7,700,536	Exp. 1,593,668
Silver, 1907.	9,562,262	10,700,236	Exp. 1,137,974

Silver Market

SILVER AND STERLING EXCHANGE.

August.	Sterling Exchange.	Silver.		Aug.-Sept.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
27	4.8600	51½	23½	31	4.8570	51½	23½
28	4.8585	51½	23½	1	4.8585	51½	23½
29	4.8580	51½	23½	2	4.8590	51	23½

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

The silver market still continues to show a slightly declining tendency. There appears to be some congestion of silver in the China commercial centers, and this helps to prevent firmness in the bullion demand.

Messrs. Pixley & Abell report silver shipments from London to the East for the year to Aug. 20:

	1907.	1908.	Changes.
India	£7,868,424	£6,143,163	D. £1,725,261
China	.....	516,400	I. 516,400
Straits	598,700	90,510	D. 508,190
Total	£8,467,124	£6,750,073	D. £1,717,051

Imports for the week were £15,000 from New Zealand and £169,000 from New York; £184,000 in all. Exports were £222,500 to India.

Copper, Tin, Lead and Zinc

DAILY PRICES OF METALS.

Aug.-Sept.	Copper.			Tin.	Lead.	Spelter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.	Cts. per lb.	Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.
27	13½ @13½	13½ @13½	60¾	29¾	4.57 @4.60	4.65 @4.70	4.50 @4.55
28	13½ @13½	13½ @13½	61	29¾	4.57 @4.60	4.70 @4.72	4.55 @4.57½
29	13½ @13½	13½ @13½	.....	29¾	4.57 @4.60	4.70 @4.72	4.55 @4.57½
31	13½ @13½	13½ @13½	61½	29	4.57 @4.60	4.70 @4.72	4.55 @4.57½
1	13½ @13½	13½ @13½	60¾	28¾	4.55 @4.60	4.70 @4.72	4.55 @4.57½
2	13½ @13½	13½ @13½	60¾	29	4.55 @4.60	4.70 @4.72	4.55 @4.57½

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

American Smelting and Refining Company—At the annual meeting in New York, Sept. 2, the old board of directors was re-elected, Mr. Page, superintendent of the Omaha works, being added to fill a vacancy. At the directors' meeting the old officers were re-elected. The usual quarterly dividends were declared, the statements submitted showing that they were fully earned. We understand that the Standard Oil interest voted a large number of shares at the meeting.

Copper—The market has been quiet throughout the week. The pressure on the part of second hands to liquidate has been relaxed, and as a result there was some semblance of strength, which, however, did not hold out very long, as the business forthcoming from legitimate sources is very small. The market closes barely steady at 13½@13½ for Lake copper; 13½@13½ for electrolytic in ingots, cakes and wirebars; 13½@13½ for casting copper.

The standard market in London has been an uninteresting affair. Fluctuations are narrow, with a strong undertone. The increase in the visible supplies for the second half of August of only 300 tons is a most encouraging sign. The close is cabled at £60 12s. 6d. for spot, £61 7s. 6d. for three months

Refined and manufactured sorts we quote: English tough, £63 10s.@64 10s.; best selected, £63 10s.@64 10s.; strong sheets, £75 10s.@76 10s.

Exports of copper for the week from New York and Philadelphia, 5427 long tons. Exports from Baltimore, reported by our special correspondent, 2168 tons of copper.

Manufactured Copper—Sheets, cold-rolled, 19c.; hot-rolled, 18c. Wire, 15¼c. base.

Tin—Notwithstanding the comparatively unfavorable statistical position of tin, which was disclosed at the end of last month, the visible supplies at that time showing an increase of 300 tons, making the same about 5400 tons larger than they were last year, this had no material effect upon the London market. The latter closes firm at £132 10s. for spot, £133 10s. for three months.

The domestic market remains exceedingly dull, consumptive demand being almost nil. Spot metal can be had at the close at about 29c. per pound.

Visible stocks of tin Sept. 1, are reported as follows, in long tons:

	In Store.	Afloat.	Total.
Great Britain.....	5,569	6,691	12,260
Holland.....	827	183	1,010
U. S., exc. Pacific ports....	2,092	1,895	3,987
Total.....	8,488	8,769	17,257

The total shows an increase of 1295 tons during August.

Shipment of tin from the Straits in August are reported by cable as follows: United States, 765; Great Britain, 4990; other Europe, 400; total, 6055 long tons, an increase of 1004 tons over last year.

Lead—There has been some pressure from the West, which has weakened the tone of the market. The close is quoted 4.55@4.60c. New York.

London is again lower, closing at £13 3s. 9d. for Spanish lead, £13 6s. 3d. for English lead.

Production of lead in Australia in 1907 is reported as follows: Broken Hill Proprietary Company, 54,164 long tons; Sulphide Corporation, 22,394; Tasmanian Smelting Company, 10,100; Queensland Smelting Works, 3747; Freemantle Smelting Works, 400; total, 90,805 long tons.

Spelter—Galvanizers in the Middle West have placed fair-sized orders, and though the business was not large, prices have stiffened, due to the sensitive condition of the market. The close is firmer at 4.55@4.57½c. St. Louis, 4.70@4.72½c. New York.

The London market is also somewhat higher, quotations being cabled at £19 7s. 6d. for good ordinaries, £19 12s. 6d. for specials.

Zinc Sheets—Base price is 7c. f.o.b. La Salle-Peru, Ill., less 8 per cent.

Other Metals

Antimony—The market has been quiet, with only small business. Prices are slightly weaker at 8½@8¼c. for Cookson's; 7½@8¼c. for Hallett's; 7½@7¾c. for ordinary brands.

Aluminum—Ingots, American No. 1, in large quantities, 33c. per lb. Rods and wire, 38c. base; sheets, 40c. base.

Cadmium—In 100-lb. lots, \$1.25 per lb., at Cleveland, Ohio.

Nickel—According to size of lot and terms of sale, 45@50c., New York.

Quicksilver—New York price is \$43 per flask for large lots; small orders depend on size and conditions. San Francisco nominal, about \$42.50 for domestic orders, and \$41 for export. London higher, at £8 2s. 6d. per flask, with £8 quoted from second hands.

Platinum—This metal continues to be offered at \$17.50@19 per oz. for refined platinum. Dealers quote \$15@15.50 for scrap metal.

Wisconsin Ore Market

Platteville, Wis., Aug. 29—The highest prices paid for zinc ore was \$37 on a basis of \$36 per ton of 60 per cent. zinc. For 80 per cent. lead ore, \$60 per ton was paid. Shipments for week ended Aug. 29 were:

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Benton.....	924,750	197,980	.....
Platteville.....	583,200	.....	.....
Hazel Green.....	418,000	.....	.....
Cuba City.....	315,870	88,590	.....
Livingston.....	170,000	.....	.....
Galena.....	159,300	.....	.....
Total.....	2,571,120	286,570	.....
Year to Aug. 29.....	62,006,501	7,338,165	1,262,014

Mineral Point, Linden, Highland and Harker are not reported but will be included next week. In addition to the above there was shipped to the Joplin Separator Works, at Galena, from Hazel Green, 158,500 lb. and from Rewey, 124,000 lb. zinc concentrates; also to the Enterprise roaster, at Platteville, from Strawbridge, 154,000 lb. zinc concentrates.

Missouri Ore Market

Joplin, Mo. Aug. 29—The highest price reported paid for zinc ore was \$40 per ton, on a base price of \$37. Some ore, however, sold as high as \$37.50 per ton of 60 per cent. zinc. Silicate sold as high as \$26.50 base, bringing \$20@24 per ton. The average price, all grades, was \$33.78 per ton. The highest price paid for lead ore was \$59.50 per ton, medium grades bringing \$58@59 and the average price, all grades, was \$58.46 per ton.

The week's market was generally quiet on a \$36.50 base for zinc up to Thursday noon, but in the afternoon one purchasing agent played havoc with the level of prices all other purchasing agents had decided upon, and with the prospect of a \$36 base for next week. The market is in such an unsettled condition that prices could easily be manipulated up to a \$40 base price. But for the determined stand of sellers to hold the market up it would be as easy to dump the price \$2 to \$3 per ton, but it seems impossible to secure concerted action.

Following are the shipments for the week ending Aug. 29:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville.....	3,508,870	795,820	\$84,180
Joplin.....	2,179,680	307,190	48,213
Galena.....	718,080	158,300	16,707
Alba-Neck.....	714,900	.....	12,868
Duenweg.....	417,060	121,690	10,885
Grauby.....	562,670	62,320	9,700
Spurgeon.....	386,430	82,900	7,829
Orougo.....	310,730	300	6,195
Prosperity.....	223,920	69,770	5,958
Carthage.....	29,000	.....	5,220
Badger.....	212,590	30,390	4,723
Miami.....	358,460	.....	4,300
Aurora.....	225,400	9,480	3,251
Quapaw.....	204,830	1,490	2,911
Zincite.....	151,800	.....	2,580
Sarcozie.....	79,570	.....	1,432
Peoria.....	37,300	.....	356
Stott City.....	17,070	.....	290
Totals.....	10,629,260	1,640,660	\$227,578

Eight months.....329,091,170 51,264,590 \$6,951,735
Zinc value, the week, \$179,613; 8 months, \$5,535,792
Lead value, the week, 47,965; 8 months, 1,416,003

Average prices of ores in the Joplin market by months have been, per short ton, as follows:

Month.	ZINC ORE.				LEAD ORE.	
	Base Price.		All Ores.		All Ores.	
	1907.	1908.	1907.	1908.	1907.	1908.
January.....	\$16.90	\$37.60	\$45.84	\$35.56	\$83.58	\$16.88
February.....	48.30	36.63	47.11	34.92	84.58	49.72
March.....	49.75	36.19	48.66	34.19	82.75	49.90
April.....	49.25	35.40	48.24	34.08	79.76	52.47
May.....	46.90	34.19	45.98	33.39	79.56	56.05
June.....	47.00	33.06	44.82	32.07	73.66	60.48
July.....	46.80	34.55	45.79	31.67	58.18	59.90
August.....	44.56	36.53	43.22	33.42	59.54	60.34
September.....	41.00	.....	40.11	.....	53.52	.....
October.....	41.75	.....	39.83	.....	51.40	.....
November.....	38.60	.....	35.19	.....	43.40	.....
December.....	31.50	.....	30.87	.....	37.71	.....
Year.....	\$44.36	.....	\$43.68	.....	\$68.90	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

Chemicals

New York, Sept. 2—There is little change in the market, and prices remain generally steady. Little is said yet about contract business, and spot trade is only fair. A little more inquiry is reported, but has not resulted in actual business so far.

Copper Sulphate—Business is a little better. Prices are unchanged and firm at \$4.65 per 100 lb. for carload lots or over, and \$4.90 for smaller parcels. An advance is not unexpected.

Nitrate of Soda—Trade at present is chiefly on a small scale, and prices are unchanged.

Mining Stocks

New York, Sept. 2—The market on the Stock Exchange has shown advances during the week, with some reactions, but on the whole a stronger tendency than in the previous week. It is still largely a professional market, with only moderate outside dealing.

On the Curb market, trading was dull, on the whole, though some of the copper

stocks showed strength and fair activity. There was a generally improved tone, and the close is rather firm.

Boston

Sept. 1—There has been a gradual hardening tendency in mining shares the past week, and some stocks are materially higher. Amalgamated rose \$5 to \$82 during the week, but sold a trifle below this today. Copper Range and North Butte have also done better. The former rose \$3 to \$80.75, and the latter on large trading sold up \$6.50 to \$89.50, both receiving some setbacks. Copper Range directors have declared the regular quarterly dividend of \$1 per share. Arizona Commercial has given a good account of itself, rising \$7.25 to \$27.50. This company's \$500,000 new 6-per cent. convertible bonds were successfully placed with stockholders, and the issue has been put on the unlisted sheet. They have risen from \$103 to \$117. The forthcoming North Butte dividend will be mailed to some 4300 stockholders, which is an increase of 33 per cent. over a year ago. Old Dominion rose \$5.50 to \$43.50. The petition of A. S. Bigelow to have the recent injunction modified has been denied by the Massachusetts Supreme Court. Utah Consolidated rose \$1.50 to \$47.50.

On the Curb, Ahmeek touched \$100. East Butte, now traded on the Curb around \$5, is likely to go onto the unlisted sheet of the Exchange shortly, as well as shares of the North Lake Mining Company.

STOCK QUOTATIONS

NEW YORK Sept. 1		BOSTON Sept. 1	
Name of Comp.	Ctg.	Name of Comp.	Ctg.
Alaska Mine.....	9 1/2	Adventure.....	9 1/2
Amalgamated.....	80 1/2	Allouez.....	37 1/2
Anacnda.....	48 1/2	Am. Zinc.....	127 1/2
Balakiala.....	2 1/2	Arcadian.....	4
British Col. Cop. butte & London.....	8	Arizona Com.....	27
Butte Coalition.....	27 1/2	Atlantic.....	15 1/2
Colonial Silver.....	3 1/2	Bingham.....	40
Cum. Ely Mining.....	8 1/2	Boston Con.....	13
Davis Daly.....	2 1/2	Calumet & Ariz.....	124 1/2
Dominion Cop.....	2 1/2	Calumet & Hecla.....	670
Douglas Copper.....	4	Centennial.....	34
El Rayo.....	2 1/2	Con. Mercur.....	43
Florence.....	3 1/2	Copper Range.....	80
Foster Cobalt.....	46	Daly West.....	9
Furnace Creek.....	20	Franklin.....	14 1/2
Giroux.....	4 1/2	Greene-Can.....	11 1/2
Gold Hill.....	6 1/2	Isle Royal.....	24 1/2
Goldfield Con.....	6 1/2	La Salle.....	14 1/2
Granby.....	105	Mass.....	7
Greene Gold.....	1 1/2	Michigan.....	14 1/2
Greene G. & S.....	10	Mohawk.....	67 1/2
Greenw'r & D.Val.....	75	Nevada.....	16 1/2
Guanajuato.....	2 1/2	North Butte.....	88
Guggen. Exp.....	177 1/2	Old Colony.....	55
Hanapah.....	20	Old Dominion.....	42 1/2
McKinley Dar.....	75	Osceola.....	114 1/2
Mimac.....	2 1/2	Parrot.....	27 1/2
Mines Co. of Am.....	1 1/2	Quincy.....	95
Mitchell Mining.....	3 1/2	Rhode Island.....	4
Mont. Sho. C.....	1 1/2	Santa Fe.....	2
Nav. Utah M. & S.....	3 1/2	Shannon.....	15 1/2
Newhouse M. & S.....	6 1/2	Superior.....	24 1/2
Nipissing Mines.....	8 1/2	Tamarack.....	76
Old Hundred.....	3 1/2	Trinity.....	19 1/2
Silver Queen.....	1.06	United Cop., com.....	11
Stewart.....	1 1/2	U. S. Oil.....	26
Tennessee Cop'r.....	37 1/2	U. S. Smg. & Ref.....	41
Tri-Bullion.....	1 1/2	U. S. Sm. & Re., pd.....	45 1/2
Un-in Copper.....	1	Utah Con.....	47 1/2
Utah Exp.....	4 1/2	Victoria.....	5 1/2
Utah Copper.....	45 1/2	Winnona.....	36 1/2
Yukon Gold.....	4 1/2	Wolverine.....	145
		Wyandotte.....	2 1/2

*Ex. Div. †Ex. Rights.

‡Last quotation.

N. Y. INDUSTRIAL

Am. Agri. Chem.....	25 1/2
Am. Smelt. & Ref.....	99
Am. Sm. & Ref., pf.....	100 1/2
Bethlehem Steel.....	22 1/2
Colo. Fuel & Iron.....	37 1/2
Federal M. & S., pf.....	18 1/2
Inter. Salt.....	18 1/2
National Lead.....	85 1/2
National Lead, pf.....	102 1/2
Pittsburg Coal.....	112
Republic I. & S.....	24
Republic I. & S., pf.....	81
Sloss-Sheffield.....	64 1/2
Standard Oil.....	63 1/2
U. S. Red. & Ref.....	115 1/2
U. S. Steel.....	46 1/2
U. S. Steel, pf.....	111 1/2
Va. Car. Chem.....	29

BOSTON CURB

Ahmeek.....	198
Black Mt.....	3 1/2
East Butte.....	8 1/2
Hancock Con.....	16 1/2
Keweenaw.....	6
Majestic.....	.65
Raven.....	.95
Shawmut.....	.31
Superior & Pitts.....	14 1/2
Troy Man.....	4.35

ST. LOUIS Aug. 29

N. of Com.	High.	Low.
Adams.....	.40	.30
Am. Nettle.....	.05	.03
Center Cr'k.....	2.00	1.50
C. C. & C. pd.....	67.00	66.00
C. C. & C. pd.....	78.00	76.00
Cent. Oil.....	110.00	100.00
Columbia.....	5.00	4.00
Con. Coal.....	19.00	17.00
Doe Run.....	125.00	110.00
Gra. Bimet.....	.20	.18
St. Joe.....	15.00	12.50

LONDON Sept. 2

Name of Com.	Ctg.
Dolores.....	£1 10s 0d
Stratton's Ind.....	0 1 0
Camp Bird.....	0 13 6
Esperanza.....	3 8 0
Tomboy.....	1 3 9
El Oro.....	1 7 0
Oroville.....	0 9 9

Cabled through Wm. P. Bonbright & Co., N. Y.

NEVADA STOCKS. Sept. 2.

Furnished by Weir Bros. & Co., New York.

Name of Comp.	Ctg.	Name of Comp.	Ctg.
COMSTOCK STOCKS		Silver Pick.....	.19
Belcher.....	.19	St. Ives.....	.26
Best & Belcher.....	.48	Triangle.....	.06
Caledonia.....	.19	BULLFROG STOCKS	
Chollar.....	.17	Bullfrog Mining.....	.03
Comstock.....	1.26	Bullfrog Nat. B.....	.04
Con. Cal. & Va.....	.85	Gibraltar.....	.04
Crown Point.....	.28	Gold Bar.....	.04
Exchequer.....	.26	Homestake King.....	.24
Gould & Curry.....	.10	Montgomery Mt.....	.10
Hale & Norcross.....	.31	Mont. Shoshone C.....	.87 1/2
Mexican.....	.72	Original Bullfrog.....	.01
Ophir.....	2.20	Tramp Cons.....	.17
Overman.....	.11	MANHATN STOCKS	
Potosi.....	.20	Manhattan Cons.....	.08
Savage.....	.29	Manhat'n Dexter.....	.07
Sierra Nevada.....	.27	Jumping Jack.....	.03
Union.....	.22	Stray Dog.....	.03
Utah.....	.05	MISCELLANEOUS	
Yellow Jacket.....	.56	Golden Boulder.....	.07
TONOPAH STOCKS		Bonnie Clare.....	.08
Belmont.....	1.06	Lee Gold Grotto.....	..
Extension.....	.75	Nevada Hills.....	1.31 1/2
Golden Anchor.....	.02	Nevada Smelting.....	1.12 1/2
Jim Butler.....	.26	Pittsburgh S. Pk.....	1.02
MacNamara.....	.52	Round Mt. Sphinx.....	.14
Midway.....	.34		
Montana.....	1.37 1/2		
North Star.....	.08		
Tono'h Mine of N.....	7.37 1/2		
West End Con.....	.60		
GOLDFIELD STOCKS			
Adams.....	.04		
Atlanta.....	.30		
Booth.....	.45		
Columbia Mt.....	.29		
Comb. Frac.....	1.53		
Cracker Jack.....	.06		
Dia'ldfield B. B. C.....	.17		
Goldfield Belmont.....	.15		
Goldfield Daisy.....	.73		
Great Bend.....	.34		
Jumbo Extension.....	.45		
Katherine.....	..		
Kendall.....	.16		
Lone Star.....	.10		
May Queen.....	.06		
Oro.....	.14		
Red Hill.....	.30		
Roanoke.....	..		
Sandstorm.....	.27		

COLO. SPRINGS Sept. 2

Name of Comp.	Ctg.
Acacia.....	6 1/2
Black Bell.....	..
C. C. Con.....	3 1/2
Dante.....	16 1/2
Elkton.....	17
El Paso.....	60 1/2
Findlay.....	39 1/2
Gold Dollar.....	16 1/2
Gold Sovereign.....	13
Isabella.....	28
Index.....	..
Jennie Sample.....	2
Jerry Johnson.....	14
Mary McKinney.....	30
Pharmacist.....	3 1/2
Portland.....	1.01
Un. Gold Mines.....	4
Vindicator.....	84
Work.....	15

Assessments

Company.	Delinq.	Sale.	Amt.
Alta, Nev.....	Aug. 25	Sept. 15	\$0.05
Belcher, Nev.....	Sept. 15	Oct. 6	0.10
Caledonia, Nev.....	Aug. 12	Sept. 2	0.05
Challenge Con., Nev.....	Aug. 31	Sept. 22	0.05
Exchequer, Nev.....	Aug. 11	Sept. 1	0.05
Hale & Norcross, N.....	Sept. 3	Sept. 24	0.10
Julia, Nev.....	Aug. 21	Sept. 14	0.03
Little Chief, Utah.....	Aug. 11	Sept. 1	0.01
Potosi, Nev.....	Sept. 4	Sept. 29	0.10
Savage, Nev.....	Aug. 27	Sept. 18	0.10
Scorpion, Nev.....	Aug. 11	Sept. 3	0.02
Signal.....	Aug. 8	Oct. 6	0.01
Talisman, Utah.....	Aug. 1	Aug. 18	0.02
Tomahawk, Nev.....	July 10	Aug. 12	0.01
Union Con., Nev.....	Sept. 15	Oct. 7	0.10
Utah, Nev.....	Aug. 12	Sept. 2	0.03
Wheeler, Utah.....	July 16	Aug. 8	0.01 1/2
Yellow Jacket, Nev.....	Aug. 10	Sept. 15	0.25

Monthly Average Prices of Metals SILVER

Month.	New York.		London.	
	1907.	1908.	1907.	1908.
January.....	68.673	55.678	31.769	25.738
February.....	68.536	56.000	31.822	25.858
March.....	67.519	55.365	31.325	25.570
April.....	65.462	54.505	30.253	25.133
May.....	65.971	52.795	30.471	24.377
June.....	67.090	53.663	30.893	24.760
July.....	68.144	53.115	31.366	24.514
August.....	67.745	51.683	31.637	23.858
September.....	67.732	..	31.313	..
October.....	62.435	..	28.863	..
November.....	35.677	..	27.154	..
December.....	54.565	..	25.362	..
Year.....	65.327	..	30.188	..

New York, cents per fine ounce; London, pence per standard ounce.

COPPER

Month.	NEW YORK.		LONDON.	
	Electrolytic		Lake.	
	1907.	1908.	1907.	1908.
January.....	24.404	13.726	24.825	13.901
February.....	24.869	12.905	25.236	13.098
March.....	25.065	12.704	25.560	12.875
April.....	24.224	12.743	25.260	12.928
May.....	24.048	12.698	25.072	12.788
June.....	21.665	12.675	24.140	12.877
July.....	22.130	12.702	21.923	12.933
August.....	18.356	13.462	19.255	13.639
September.....	15.565	..	16.047	..
October.....	13.169	..	13.551	..
November.....	13.391	..	13.870	..
December.....	13.163	..	13.393	..
Year.....	20.004	..	20.661	..

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

TIN AT NEW YORK

Month.	1907.		1908.	
	1907.	1908.	1907.	1908.
January.....	41.548	27.380	41.091	29.207
February.....	42.102	28.978	37.667	29.942
March.....	41.313	30.577	36.689	..
April.....	40.938	31.702	32.620	..
May.....	43.149	30.015	30.833	..
June.....	42.120	28.024	32.925	..
Av. year.....	..	..	38.166	..

Prices are in cents per pound.

LEAD

Month.	New York.		London.	
	1907.	1908.	1907.	1908.
January.....	6.000	3.691	19.828	14.469
February.....	6.000	3.725	19.531	14.250
March.....	6.000	3.838	19.703	13.975
April.....	6.000	3.993	19.975	13.469
May.....	6.000	4.253	19.688	12.338
June.....	5.760	4.466	20.188	12.600
July.....	5.288	4.447	20.350	13.000
August.....	5.250	4.580	19.063	13.375
September.....	4.813	..	19.775	..
October.....	4.750	..	18.531	..
November.....	4.376	..	17.281	..
December.....	3.658	..	14.500	..
Year.....	5.325	..	19.034	..

THE MINING INDEX

The editors of this paper read all the important publications of the world that relate to mining and the treatment of minerals. This index is published as a reference for all interested and to make it impossible for readers of the *ENGINEERING AND MINING JOURNAL* to miss any important article published anywhere.

We will undertake to furnish a copy of any article (if in print) in the original language, for the price quoted. Where no price is quoted the cost is unknown. These papers are not kept in stock, but must be ordered from the publisher; hence there will be some delay for foreign papers.

No accounts can be opened for these small amounts, but remittance must be sent with order. For the convenience of those making small but frequent remittances, coupons are furnished at the following prices: 20 cents each, six for \$1.00, thirty-three for \$5.00 and one hundred for \$15.00. This arrangement will be especially appreciated by foreign readers and men in distant mining camps. Where remittances are made in even dollars we will return the excess over an order in coupons upon request.

ALUMINUM

7102—CASTINGS—Method of Making Aluminum Castings in a Connecticut Foundry. (Brass World, July, 1908; 4½ pp.) Describes the methods of casting aluminum and points out the precautions necessary. 20c.

7103—METALLURGICAL CALCULATIONS. J. W. Richards. (Electrochem. and Met. Ind., August, 1908; 1½ pp.) In this instalment the metallurgy of aluminum is briefly discussed and a problem in electrical heating is given and solved. 40c.

ANTIMONY

7104—SMELTING—The Herrenscheidt's Process of Antimony Smelting. C. Y. Wang. (Min. Journ., July 25, 1908; 1½ pp.) Describes the apparatus, process and the results of the experiments. Illustrated. 40c.

ASPHALT

7105—TRINIDAD'S FAMOUS PITCH LAKE. A. Beeby Thompson. (Petrol. Rev., Aug. 1, 1908; 2½ pp.) Describes the location, methods of extraction, physical and chemical characteristics of the asphalt from this district. Illustrated. 40c.

CEMENT

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7107—PLANT—The Hydro-Electric Plant and Mill of the Superior Portland Cement Co., Superior, Wash. G. H. Moore. (Eng. Rec., Aug. 22, 1908; 1½ pp.) The construction of this cement plant is described. Much reinforced concrete is used about the plant. 20c.

COAL AND COKE

7108—ANALYSIS—Determination of the Value of Coal for Steaming Purposes. R. K. Meade. (Min. Sci., Aug. 20, 1908; 2 pp.) Continuation of article previously indexed, discussing in the present instalment the approximate analysis of coal and the apparatus used in the combustion method of determining carbon and hydrogen. 20c.

7109—AUSTRALIA—Coalfields and Collieries of Australia. F. D. Power. (Aust. Min. Stand., May 27, June 3, 10, 17, 24, July 1 and 8; 7 pp.) Continuation of article previously mentioned in this index. 82.

7110—BRIQUETS—Fuel Briquets on French Railways. Frank H. Mason. (New Zealand Mines Rec., May 16, 1908; ¾ p.) The French railways use large quantities of coal in the form of briquets, and find that they give satisfactory service. The cost is stated to be from \$3.03 to \$4.25 per metric ton. 40c.

7111—BRIQUETTED COAL in Brooklyn. C. D. Meeker. (Eng. Rec., Aug. 15, 1908; 2½ pp.) Describes the operation of a briquetting plant located on the Gowanus Canal, which has proved successful. Illustrated. 20c.

7112—BRIQUETTING—Selecting a Binder for Briquet Manufacturing. J. E. Mills. (Black Diamond, Aug. 22, 1908; 1½ pp.) The kind of binder to use, characteristics of briquets, the density desired in and the absorptive qualities of briquets are discussed. 20c.

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Abstract of a report of the Registrar-General of Births, Deaths and Marriages in England and Wales. To be continued. 40c.

7114—BRITISH COLUMBIA—Nicola Mining Division. (Brit. Col. Min. Rec., May, 1908; 5 pp.) Describes the mineral prospects and the deposits of coal in this British Columbia mining district, and includes analyses of coke made from the coal. Illustrated. 20c.

7115—COAL-CUTTING MACHINES—Electrical Coal-Cutting Machines. F. W. Hurd. (Electrician, July 10, 1908; 1½ pp.) Describes the principal features of mining coal by means of electrical coal cutters. 40c.

7116—COAL-HANDLING PLANT—Inclined Retort Coal and Coke-Handling Plant at Bristol. William Stagg. (Engineering, July 31, 1908; 4½ pp.) Describes the method of handling coal at a large English gas plant. Illustrated. 40c.

7117—COKE BY-PRODUCTS—Recovery of Coke By-Products in Rhenish-Westphalia. (Iron and Coal Tr. Rev., July 31, 1908; ¾ p.) By-product ovens increased from 538 in 1893 to 2964 in 1900. Gives figures of production of sulphate of ammonia, coal tar and other products. 40c.

7118—COKE OVENS—A New System of Modern Coke Ovens. F. Fieschi. (Eng. and Min. Journ., Aug. 22, 1908; 4½ pp.) Details of construction and operation which permits saving by-products and excess gases. Discussion of horizontal and vertical flues. Illustrated. 20c.

7119—COLLIERY VILLAGE—A Model Colliery Village. (Coll. Guard., Aug. 14, 1908; 1½ pp.) The manner of laying out the village at the Brodsworth colliery near Doncaster, England, is described in detail. 40c.

7120—COMBUSTION OF COAL upon Grates. E. G. Bailey. (Eng. and Min. Journ., July 25, 1908; 1½ pp.) Describes the distribution of heat, air excess, unburned gases, unburned coal, and rate of combustion in boilers. 20c.

7121—CONVEYER—The Gibb Underground Conveyer. (Coll. Guard., Aug. 7, 1908; 2½ pp.) Briefly mentions two types of conveyers for clearing away under-cut coal from the face, which have not proved satisfactory, and describes the Gibb conveyer which, it is claimed, will solve the problem of conveying coal in the working of thin seams. 40c.

7122—ELECTRICAL INSTALLATION at the Ferndale Collieries. (Iron and Coal Tr. Rev., July 31, 1908; 3 pp.) Describes the power plant, electric hoisting engines and other equipment of these English collieries. Illustrated. 40c.

7123—EXPLOSIONS—Effect of Humidity on Mine-Explosions. C. Scholz. (Paper to be read before the A. I. M. E., Oct., 1908; 8 pp.) This paper is the result of several years' observation of conditions in various coal mines and coalfields in the United States. It is pointed out that temperature, altitude and moisture each has its effect upon mine explosions.

7124—EXPLOSIONS—Notes on Recent Mine Disasters. James Ashworth. (Eng. and Min. Journ., Aug. 15, 1908; 1½ pp.) Discusses various causes of disaster in mines and suggests certain precautions which should be taken. 20c.

7125—EXPLOSIONS—Preventing Mine Explosions. George H. Ashley. (Mines and Minerals, August, 1908; 2 pp.) A method of working and ventilating is suggested, by which explosions may be prevented or their effects greatly minimized. 20c.

7126—EXPLOSIVES—The Use of Explosives in Collieries. William Maurice. (Electrician,

July 10, 1908; 1½ pp.) Describes improvements in explosives, the determining factors in the ignition of fire damp, blasting in the presence of coal dust, and gives suggestions for the prevention of accidents in collieries. 40c.

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7128—FIRE—The Lessons of the Hamstead Disaster. (Coll. Guard., Aug. 14, 1908; 1 p.) This editorial comments on the method of ventilation used, and discusses the subject of reversing the fan and the importance of providing breathing appliances. 40c.

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pp.) Describes the operation of the Northport smelter and the principal mines and prospects of this district of Washington. Illustrated. 20c.

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7209—BLAST FURNACE—The New Vanderbilt Furnace of the Birmingham Coal and Iron Company. (Iron Tr. Rev., Aug. 6, 1908; 5 pp.) This is a southern furnace fitted with a revolving distributor, auxiliary dust catchers and many devices looking to economical operation. Illustrated. 20c.

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7212—CASTINGS—Hard Spots in Steel Castings, with an Account of Certain Diffusion Phenomena. Arthur P. Scott. (Electrochem. and Met. Ind., August, 1908; 2½ pp.) Conclusion of a previous article on this subject and discusses the practical and theoretical considerations relative to the formation of hard spots in steel castings. 40c.

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7216—ELECTRIC SMELTING—The Reduction of Iron Ores by Electricity. C. F. Elwell. (Journ. of Electricity, Power and Gas, July 18, 1908; 3 pp.) Discusses the history of iron smelting in the electric furnace, and then describes the furnace itself, giving examples of the cost of operation. Illustrated. 20c.

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data relative to charges for making steel and alloys. Illustrated. 40c.

7218—ELECTRO-METALLURGY of Iron and Steel. S. Dushman. (Trans. Eng. Soc. Univ. of Toronto, No. 20, 1906-1907; 17 pp.) Describes the Stassano process and furnace; the Keller electric high furnace; the Heroult process; the Kjellin process and describes the production of steel and iron in the electric furnace. Illustrated. 60c.

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7227—VANADIUM DETERMINATION—A New Method for the Determination of Vanadium in Iron and Steel. Edward DeMille Campbell and Edwin Le Grand Woodhams. (Journ. Am. Chem. Soc., August, 1908; 4 pp.) Describes a method of determining vanadium in small quantities in the presence of a large amount of iron. 80c.

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MINING—GENERAL

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