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MR. EDMUND C. PECHIN, a very well-known metallurgist, has taken charge of the pig-iron department, recently established, of Messrs. CON-DIT, FULLER & Co., of Cleveland, Ohio.

THE news from Mexican mining regions, so far as it relates to American enterprises, is not encouraging; in fact, every thing points to a pretty complete collapse of the boom. Old mines, on which Americans have spent very large sums of money, are again practically abandoned, and it looks as though the partial failure of the crops in that country, with the attendant exceedingly high prices for corn, would seriously embarrass even those who have thus far survived.

MANUFACTURERS of mining machinery in this country are often puzzled by the peculiarities in the correspondence of would-be customers, notably in Spanish-American countries. They appear to labor under the impression that a machinery plant can be ordered like a few yards of

cloth or a jack-knife. Their letters run about thus: "I have a good silver mine. How much would it cost, deducting best discounts, to put up a mill to work ten tons a day? There is no American machinery in this exceedingly rich mining district, so that, if yours proves a success, you will obtain many additional orders. Under the circumstances, I expect you to give me your very lowest prices." We need hardly say that nothing is more annoying to a business man than to deal with such persons, who do not know what they want, or if they do, are too negligent to give full details. If our Spanish-American friends expect prompt and detailed replies, they must learn accurately to define the circumstances of their case, append sketches of location, character of ore, nature and cost of fuel, or volume and head of water-power, distance from nearest port and state of roads or trails.

It is undoubtedly a great misfortune that the management of the anthracite coal trade is so largely influenced by the struggles of bears and bulls in Wall street. We do not know of any one industry, the condition of which is so systematically misrepresented to the public. On the one hand, it is claimed, with a persistency worthy of a better cause, that nothing can avert a complete collapse; while, on the other side, there are always people ready to assert unflinchingly that "coal is moving along exceedingly well; that prices are firmly maintained, and that orders can not be filled as rapidly as they are accumulating." If the raids of the bears and the whoops of the bulls were confined to outsiders, and the trade were allowed to move along on its own merits; if the supply were regulated by the requirements of consumers; those in the business would pass by these conflicting stories without noticing them. But it is an open secret that in reality the movement of coal stocks in Wall street has an important influence on the decisions reached in regard to the regulation of the trade. The tape receives more attention than the reports of sales agents, and a sharp upward or downward movement of stocks is only too often more potent in shaping the policy of the companies than a plethora or a scarcity of coal. It is true that occasionally measures for the best of the trade must yield to the necessities imposed on the managers by the financial condition of the concern in their charge. It may be, and often is, only a matter of choice between two evils, and there can be no hesitation in removing that which is more pressing. It is deplorable that such a condition of affairs exists, and it has a very bad effect upon the trade at times; but it can not be condemned as trickery with private gain as the ulterior object. Unfortunately, the latter element is not wanting in the higher councils of the coal trade. It is an element that threatens the prosperity of an enormous industry and prevents the business-like handling of a trade in which vast sums of money are invested. Even without it, widely differing interests are difficult to harmonize; with it, those interests become, to some extent, the football of speculators.

The anthracite coal combination, which some delight in picturing as a grasping monopoly, is a very loose confederation, the existence of which very slight disturbances threaten seriously. It is not too much to assert that it is in imminent danger of complete disruption if matters are allowed to drift on as they are now doing. There are those who are heartily weary of seeing one company attempting to overreach the others in an underhand way, and of the cajoling and temporizing to keep up a semblance of harmony. It needs only a small impulse to convert this feeling into open war. Such is the situation to-day. No one is more keenly alive to the disastrous effect of such a rupture than we, and no one more eager to see it averted. We are convinced that most of those who control the future of the coal trade are heartily in favor of maintaining the system of restriction of output, which alone can save the companies from irreparable loss. The irritation has not yet reached a point where calm argument is disregarded.

So far as the present season is concerned, the chances of a fair market were forfeited when it was decided to do full work in August and stop only one week in September. The stoppage for the first week of October, announced this week, can do nothing to repair that damage. It only prevents an intolerable aggravation of the evil. We have in the past shown that the present mode of restriction alone must ultimately end in a disruption of the combination. We are forced to add now that, unless it is removed more than hitherto from the influences of Wall street, its lease of life will be even shorter.

From Philadelphia comes the statement, paraded in the daily press, that an allotment plan has been adopted for the coming year, and it is even stated that the percentages are to be the following: Philadelphia & Reading, 40; Lehigh Valley, 19; Delaware, Lackawanna & Western, 17; Delaware & Hudson, 12; Pennsylvania Railroad, 9; Pennsylvania Coal Company, 4; and the Erie, 1. This announcement, we are convinced, is premature, to say the least, and labors under the disadvantage that the figures add up to 102 per cent! However, speculators are generally in a hurry and will not stop to add, and we hope, for the benefit of those who started the canard that the ticker may record higher figures,

Since we last wrote on this subject, additional tonnage statistics have been received, from which some interesting conclusions may be drawn. Last year, there were, during the first three months, January, February, and March, eight weeks of half-time work, or 24 idle days. This year, during the corresponding period, there were thirteen half-time weeks, or 39 idle days. The output for that quarter in 1883 was 6,339,251 tons, against 5,773,722 tons in 1884. On the 1st of April, 1884, the production was 615,529 tons behind. Allowance must, however, be made for the fact that the Pennsylvania Railroad goes on undisturbed by the dictates of the combination, as it increased its tonnage in that time by 225,548 tons; the falling off in the tonnage of the other companies amounted to 841,077 tons.

During the months of April, May, June, July, and August in 1883, there were ten half-time weeks, or 30 idle days, while in 1884 there was one full week's stoppage in April, one full week and half a week in May, two full weeks in June, and two full weeks in July, a total of 39 idle days. The tonnage for the first eight months of 1883 was 19,951,165 tons, while that of the corresponding period this year was 19,314,279 tons, an apparent decrease of 636,886 tons. But as there was an increase in the tonnage of the Pennsylvania Railroad of 343,062 tons, the others show a falling off of 979,948 tons. In spite of a change in the system of restricting, by full weeks instead of half weeks, as in 1883, and in spite of an increase of idle days from 30 to 39, the tonnage of the roads in the combination was only reduced 138,871 tons since April 1st, and even that difference would have been wiped out had the market been in any thing like a fair condition during the last weeks of August. All the stoppages so dearly wrung from unwilling companies during the summer months have, therefore, practically placed the trade on a basis that would have been fair if consumption were as heavy this year as it was last.

The result is, that the trade is in its present condition, and for that Wall street is in no small degree to blame.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Butte Copper Shipments.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Would you suggest to your Butte friends that they give monthly statements of matte shipments and of ore shipments separately? So far as I understand, the agent of the Utah Northern Railroad accepts only bills of lading in which the contents, whether matte or ore, are plainly stated, there being a different freight rate. This would greatly facilitate the work of estimating the amount of fine copper in the material shipped, and would prevent the present wild guess-work. Yours truly, M.
NEW YORK, Sept. 12.

Duncan Concentrators and Frue Vanners.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I would not occupy your space again with a useless discussion of a test reported between these machines, except that Mr. Murray, in his answer to my first letter, makes a statement that covers the whole question of the fairness of the test, and which is so far from the truth that I must in charity suppose Mr. Murray to be ignorant of the real facts. The statement is, that the test was made under supervision of our own men, while the Duncan people were not represented. This we utterly deny. The Carlisle mill was visited by a man in our employ, and his report is as follows: One man ran both vanners and Duncans, and his leaning to the Duncans was not concealed. This man assumed the whole responsibility of the test. At the time of our man's visit, the vanner tailings were decidedly poorer than the Duncan tailings; yet, in the reported test, the contrary must have been the case. Furthermore, 8 Duncans were used to 5 Frues at the time of his visit; in the test, 6 to 5; and our man offered the foreman of the mill to bet a month's wages that he could beat him with 5 vanners to 10 Duncans, or in similar proportion on a smaller number. The bet was not taken. Most decidedly the test was not conducted with any voice of ours in it, or the results would never have been published in the form they were.

It is to be noted in the published test that the assay of tailings is not given. A test of this kind should certainly cover tailings assay. Had the tailings been assayed, the vanner would have showed very bad work or the Duncans extraordinary work: we know the latter is not the case, because we put on five vanners to work the tailings of the Duncans, and agreed to take pay for the machines in the concentrations produced. The inference is plain, especially with the observations of one man on the work of the vanners. I would undertake to beat the Duncan concentrator in a test with a common wash-tub if I had the running of both machines. All new concentrators beat the Frue vanner; but it is not customary in such tests to claim that they are made under the direction of our "most experienced men." Mr. James, the superintendent of the Carlisle mill, who is not responsible for the results obtained in the test, has written us, kindly offering to have a test made under fairer conditions for the vanner; that is, to accept any assistance in running the machines to the best advantage; an offer he would not have made if the test had really been conducted as stated under direction of our own men, and one we shall have much pleasure in accepting.

In regard to amalgam saving, I will quote a letter just received from the superintendent of the Little Annie mine, Colorado; "We have 16

vanners treating the tailings of 60 stamps besides working some accumulated tailings from the dam below the mill, and are not crowded. The tailings from the stamps assay \$8 gold and 3 ounces silver a ton. The tailings from the vanners assay trace of gold and 1 ounce silver a ton. Your shaking coppers and riffle amalgam savers work very well. We are saving from 20 to 45 ounces of amalgam daily, worth \$4 an ounce, and concentrations from one to two and a half tons a day, containing from \$150 to \$750 a ton in gold. The product of the vanners from the tailings of our stamp mill is more than sufficient to pay the total running expenses of our property, leaving all the gold obtained from the mill as profit."

With such testimonials from all parts of the country, we are not much alarmed at the poor results we get in tests with new concentrators.
NEW YORK, Sept. 17, 1884. W. McDERMOTT, General Agent.

THE BESSEMER STEEL PLANT OF THE WORCESTER STEEL-WORKS.

The Washburn Iron Company, of Worcester, Massachusetts, was organized in 1857 for the purpose of re-rolling railroad iron, manufacturing car-wheels, etc. In 1881, extensive additions were made to the works for the purpose of rolling steel rails from imported blooms. The close competition at home and the increased price of foreign blooms urged upon the managers of this enterprise the advisability of manufacturing their own blooms, and they have just completed the construction of a plant with which, by the Bessemer process, they will be able to carry the iron through all the processes from the pig to the perfected rail. The converters made their first blow on June 2d, 1884. The company has now the only Bessemer plant in New England, which is described as follows by the Boston *Journal of Commerce*:

The pig-iron used is the Solway, Barrow, Workington, Millon, and other brands, chiefly from the Lancashire District of England. This pig, with the spiegeleisen, which is also imported, is brought into the yard upon a spur track of the Boston & Albany Railroad, and is here piled ready for use.

The cupolas for melting the pig-iron are three in number, two 8 feet in diameter of shell by 17 feet high, which are used for the melting of the pig-iron, and one 4½ feet in diameter by 17 feet high, used for melting the spiegeleisen. Connellsville coke will be used altogether with the pig-iron in the charging of the cupolas. The iron is tapped from the cupolas upon a floor about six feet above the general level of the converting-house, and run into a ladle standing upon a Fairbanks scale at one side of the casting-pit. After from four to five tons have been gathered, the ladle is lifted by means of the central crane and poured into the converter, about 7 feet in diameter and 15 feet high, hung on trunnions. Two of these converters are in place, one of which will be used while repairs are made on the other. The bottoms of these converters give out in from twelve to fifteen heats, and duplicate bottoms are kept always at hand. Each converter is provided with a 10-inch hydraulic crane for the purpose of removing and replacing them.

After the Bessemer steel has been produced and cast into ingots, the latter are transferred by a hydraulic crane to what is known as the soaking-pit, a gas-heated furnace, where they are allowed to remain until the entire mass of the ingot becomes of the uniform temperature required for the rolling in the blooming-mill. Each ingot in its turn is then transferred by means of another crane to the roller-table of the blooming-mill, where it is passed backward and forward between the rolls of the mill until it is reduced to about seven inches square in section, and correspondingly increased in length. The rolls of the blooming-mill table are driven by an engine having a pair of 8 by 12 cylinders and controlled by a link motion. The rolls of the blooming-mill are driven by a pair of 28 by 48 reversing-engines, built by Mackintosh, Hemphill & Co., Limited, of Pittsburg, Pennsylvania.

From the blooming-mill, the bloom, as it is now called, is taken to a 4-ton hammer, where it is cut into three or four pieces, each of a weight sufficient to make one rail. The blooms are cut in such a way that the piece left shall be from the top of the ingot, as this part is apt to be the least sound. The scrap is sometimes put into the converter during the blowing of the pig-metal, when the heat is running too high, in order to cool it down. Issuing from the blooming machinery, the blooms when thus cut off are usually hot enough to be rolled directly into rails. In this case, they are taken at once to the rail train, a distance of some eighty feet, and rolled out and finished. If by any chance they have become a little too cool for rolling directly, they are passed into a regenerative gas-furnace near the hammer. This furnace, as well as the soaking-pit, is furnished with reversing valves, and works upon the Siemens regenerative principle, the gas being furnished from a producer built from plans furnished by S. T. Wellman, of Cleveland, Ohio. The rail train is a "three-high" train, built by the Birmingham Iron Foundry, Birmingham, Connecticut. By repeated passes through the different grooves of these rolls, the bloom is gradually reduced to the shape of a perfect rail.

The steam for this establishment is furnished by nine boilers 5 feet in diameter, 16 feet in length, with 100 3-inch tubes each. The blast for the converters is furnished by a vertical blowing-engine, 31-inch steam, 46 air, by 49 stroke, the steam-piston being connected directly with the blast-piston, the steam-cylinder standing below the blast and between the side frames. This engine has two 10-ton fly-wheels, and was built by Mackintosh, Hemphill & Co., Limited, of Pittsburg, Pennsylvania. The rail train is driven by a George H. Corliss engine, 34 by 60 inches. This establishment also carries on extensively the manufacture of car-wheels, having a capacity of seventy-five chilled wheels a day. These wheels are made from Salisbury car-wheel iron. The officers of the company are George M. Rice, President; Samuel D. Nye, Manager; Edwin Gleason, Treasurer; M. J. P. McCafferty, Secretary; William E. Colles, Superintendent; P. Barnes, Engineer.

A CABLE from Paris states that the commission to which the Tonquin mines have been referred advises the government to send out exploring parties to examine and report upon their possibilities.

THE PHILADELPHIA MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.—III.

In the afternoon, the members and a large number of ladies assembled on the steamer Elwin Forrest for an excursion on the Delaware River. Favored by excellent weather, the trip down to Wilmington and return by moonlight was delightful.

On Thursday morning, the Institute attended the opening session of the American Association for the Advancement of Science. In the afternoon, in spite of hot weather, a large number of the members were present at

THE FOURTH SESSION.

which was opened with a paper by Mr. W. H. Adams, on the Spence Automatic Desulphurizing Furnace, to which we have already referred recently, and of which we shall present an illustrated description in an early issue.

This was followed by the presentation, by Mr. C. A. Stetefeldt, of

NOTES ON THE PATIO PROCESS.

The hacienda of Saucedá is one of the largest and finest haciendas in the vicinity of the city of Zacatecas, Mexico, and is said to reduce ores by the patio process cheaper than any other establishment. It receives its supply of ore from the San Acacio mine. This mine has not been for some time, like most of the Zacatecas mines, in bonanza, and yields, at present, ore of rather low grade. The silver occurs principally as silver glance, ruby silver, and native silver, associated with pyrites of iron and copper, and some galena and zincblende, in a gangue of pure quartz that takes the form of amethyst whenever the ore is of high grade. All the ore, as it comes from the mine, is broken by hand into small pieces and sorted before it is delivered to the hacienda. Here it is first crushed dry by Chili mills, and then ground wet in arrastras to an impalpable powder. The sulphurets not decomposed in the patio process are separated in the settlers from the tailings, and concentrated by hand. By roasting them in reverberatory furnaces with carbonate copper ore, magistral is obtained. All machinery is driven by mule-power.

In the year 1883, the hacienda Saucedá reduced 17,726 tons of ore. The average value of the ore was 17 11 ounces of silver per ton. Of this, 4.37 ounces, or 25.5 per cent, were lost. The loss in quicksilver was one pound per 7.4 ounces of silver extracted. The total expenses of reduction were \$8.12, Mexican money, per ton of ore, distributed as follows, namely:

Pulverizing in Chili mills	\$1.03
Grinding in arrastras	2.06
Salt, from 5 to 6 per cent	1.13
Magistral	0.80
Quicksilver, 1.71 pounds	0.96
Other items and general expenses	2.14
Total	\$8.12

In considering these results by themselves, as far as the percentage of silver extracted is concerned, one would get an entirely wrong view regarding the perfection of the patio process. It seems that the loss in silver is more or less a constant quantity per ton of ore, that it is about the same for poor and for rich ores, whereby the percentage of silver extracted from high-grade ores becomes remarkably high. The following statistics, taken from the books, will illustrate this:

Assay value of ore. Ounces silver per ton.	Percentage of silver lost.
32.23	10.0
37.00	10.0
42.60	6.1
47.60	5.6
90.60	7.0

These figures are rather disappointing to those who believe that they can improve the reduction of certain ores in Mexico by the introduction of modern methods. Of course, there are many ores that will not yield a high percentage of silver in the patio.

The same is to be said about the cost of reduction. Modern methods mean the replacing of mule-power by steam-power. In districts destitute of fuel, like Zacatecas, this is a serious question. So far, the Mexican Central Railroad has not established freight rates sufficiently low to permit the importation of coal, and it would be a hazardous undertaking for any mining company to rely on a temporary concession as long as there is no competition. On the other hand, the cost of the patio process depends largely on the price of corn. When, in dry years, the crops fail, the price of corn may be four times as high as in normal years. The estimates above are based on normal prices of corn.

Captain W. R. Jones, of the Edgar Thomson Steel-Works, exhibited some specimens of the ferro-manganese made in Furnace A. The product carries from 84 to 92 per cent of manganese, from 6.5 to 7 per cent of carbon, 0.14 per cent of phosphorus, and 0.25 per cent of silicon. It is made chiefly from Cremora ore, Augusta County, Va., which, according to an analysis by Mr. A. S. McCreath, contains:

Binoxide of manganese	81.703	Sulphuric acid	none
Protoxide of manganese	7.281	Phosphoric acid	171
Sesquioxide of iron	55.3	Alkalies	467
Oxide of cobalt	35.4	Water	3,405
Oxide of nickel	0.36	Silica	2,138
Oxide of zinc	6.23		
Oxide of copper	none		100.000
Alumina	8.96		
Baryta	8.29	Metallic manganese	57.291
Lime	8.81	Metallic iron	373
Magnesia	0.90	Phosphorus	0.75

Prof. B. Silliman, of New Haven, Conn., read a paper on

THE ADAPTATION OF THE SIEMENS FURNACE TO GLASS-MAKING.

The Secretary then read a communication, by R. P. Rothwell, describing

A NEW PRESSURE FILTER

for filtering solutions containing precipitated gold in suspension.

Dr. H. M. Chance, formerly of the Second Geological Survey of Pennsylvania, exhibited specimens of coal from

THE DEEP RIVER COAL-BEDS OF NORTH CAROLINA,

which the State has decided to develop under Dr. Chance's supervision. The Deep River is a branch of the Cape Fear River, and joins the latter

stream some distance southwest of Raleigh. The beds along the river are 30 miles in length, but very narrow. He does not believe there is any connection between these fields and the Danville beds, although there are some indications that a basin existed between the two. There are two deposits of workable coal, one 3 feet thick and another 40 feet below it 2 feet in thickness. In the series to which the larger vein belongs, there is a black band that contains numerous organic remains. During the war, these beds were worked and the coal was floated down the river to Wilmington for the use of steamers running the cotton blockade, but no work has been done for a long time. Some of the coal found is claimed by some to resemble anthracite. It could be mined for \$1.30 a ton.

President Bayles announced that the report of the committee of experts who had been appointed to investigate the cause of the Pocahontas mine explosion will shortly be in print and ready for distribution among the members. The meeting then adjourned. In the evening, at the Academy of Music, before the American Association, to which the Institute was invited, Prof. J. S. Newberry delivered a lecture on the Geological Evolution of the North American Continent.

THE FIFTH SESSION

was called to order at ten o'clock, and after some routine business, including the reading of the list of newly-elected members and associates, Mr. Hartman, of Philadelphia, read Mr. W. J. Taylor's paper on

EXPERIMENTS WITH A STRAIGHT OR NO-BOSH BLAST-FURNACE,

from which we quote as follows:

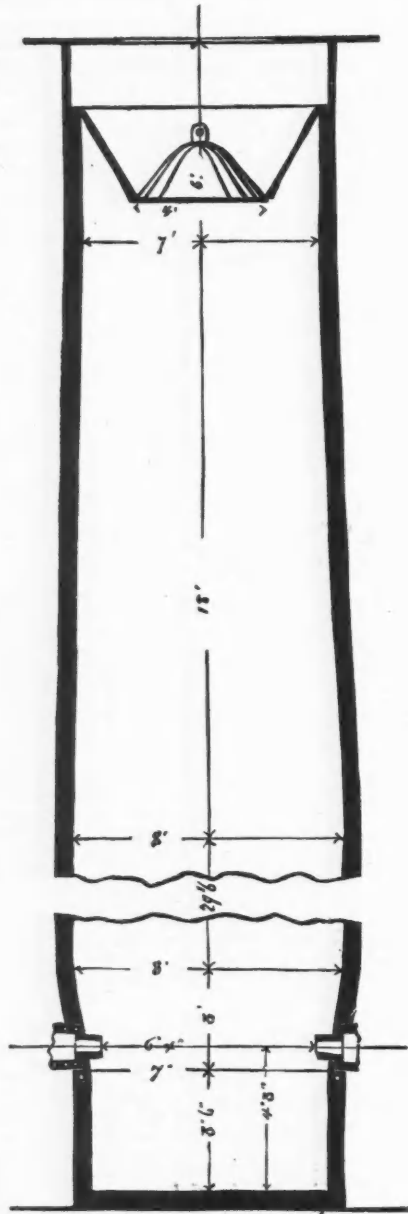
"It is perhaps more important to put on record the particulars of experiments that are decided failures than those that are a success, as those of the latter class are certain to live, while the former may be lost sight of in a short time and repeated by others. To this end, I propose to give the particulars of a straight or no-bosh furnace just made at the Chester (New Jersey) furnace, which was such a decided failure as to leave no doubt of the plan being wrong, and determining the necessity of a blast of some kind, as of old.

"Some experiences during the past year led me to suppose that the bosh or belly of a furnace was unnecessary, and that the contraction of the walls toward the bottom for the stock to wedge in, in its descent, facilitated dirty walls and scaffolding; hence, irregularity and high fuel. I concluded, however, that a very shallow bosh for a skew-back support to the stock would be necessary, and that the proper place for this was in the tuyere section, beginning just below the tuyeres and ending just above them, where there is nothing in the solid state but fuel, which is consuming, and no slipping or travel of stock takes place. The cubical capacity of a furnace of this design would necessarily be much less than in the old style unless it was made very much higher. But I assumed that the loss of room for reduction could be overcome by making the size of the ore and stone charged much smaller, so that the gases would act more quickly. The next point was, what should be the size of the shaft, crucible, tuyere-circle, and tunnel-head for a given quantity of air.

"My first design was 12 feet diameter of shaft for 7000 feet of air, with a 9-foot crucible and 8-foot tuyere-circle. This I soon reduced to 8-foot shaft diameter, which I concluded was large enough for economical work if regular travel of the stock on the walls could be maintained. I consulted with a number of experienced furnace-men and furnace engineers, and the plan was well thought of by many of them, and, as I had also some offers of financial aid from them toward the risk of trying the experiment, my firm concluded to make the trial in its Chester furnace, which was 13 feet by 60 feet, blowing 7000 feet of air maximum. The furnace was lined accordingly, the shaft 8 feet for 36 feet up and drawn to 7 feet at the stock line, bell 4 feet, crucible 7 feet, tuyere-circle 6 feet 4 inches, all as shown in cut. The lines of the lower part of the furnace for 14 feet above the tuyeres were held by vertical water-pipes 7 inches apart, with 8 inches of brick inside, and one horizontal pipe just underneath the tuyeres. The furnace was filled about in the usual way—fuel, half coke and half anthracite—and fired at eight A.M., July 17th. Burned well by fanning with the engine, and blast was put on and bell closed at two P.M. Commenced blowing with 3400 feet of air through four 5-inch tuyeres. The oven (Weimer, suspended pipes) had been well fired with wood, and the heat came up well, but the gas was thin and cold from the start. Pressure light, less than one pound for the first hour, but went up normally and stock settled pretty regularly until about six P.M., when very decided irregularities commenced. Pressure very high at times, no gas and stock not settling. Temperature of blast at half past six P.M. was 600 degrees. From this time for the next five hours, the furnace could only be eased by throwing off the blast, when the pressure would tighten, gas come and stock settle occasionally. On throwing on blast at sixteen minutes past eleven P.M., burst one of the pipes in oven and stopped 29 hours for repairs. Oven had been fired and heat came up rapidly on starting Saturday morning, 19th, at forty minutes past three A.M. Pressure 2 pounds with 3400 feet of air, and a small quantity of gas soon made its appearance at boilers and oven. Stock did not settle, however, and pressure soon went up, which was again relieved by throwing off blast. In this way, the furnace was nursed until about eleven A.M., when stock settled well and matters looked encouraging. Filled 7 tons coke as blanks and got first flush of cinder at cinder notch at a quarter past three P.M. Continued to work fairly well until three o'clock Sunday morning, when we cast five beds poor white iron. Furnace then tightened up and gas disappeared. At seven A.M., exploded five cartridges of giant powder in the center of the furnace about 13 feet above the tuyeres. This, together with throwing off the blast and not filling for a time when the stock settled, gradually brought the furnace into working shape again, but only for making a small quantity of white iron, even with the low burden of one to one. On Monday, 21st, opened four test-holes in walls 3 feet above the tuyeres and found stock quite cold—only red-hot—next to walls for about 2 feet in all round. This stock, consisting mainly of fuel, was principally fine, and appeared to be moving, but very slowly compared with the center. We also opened holes 13 and 20 feet above the tuyeres, and found practically the same conditions—cold stock; but not specially fine, next to walls for about 2 feet. This showed only four feet in diameter or one quarter of the area of the furnace for active work, and explained the whole trouble, and also proved that straight walls would not prevent accumulations on them, or perhaps scaffolding. We then

blew the furnace down to within 4 feet of the tuyeres, when the walls cleaned themselves, and test-rods showed greatest heat next to walls; but in filling up again, the old troubles reappeared, stock settled irregularly and by jumps, particularly when the furnace was nearly full. The accumulations on walls over tuyeres were the same, iron nothing but white unless blanks or very light burden was working, and even then we could make nothing better than gray forge.

"After working in this irregular way for a few days, we blew down



again; and when a little more than half-way down, found the stock active and hot on walls, and we commenced filling up again. First 12 hours put in 18 tons of blanks with a slag and limestone burden only, then 20 tons blanks in next 12 hours with slag and scrap, but after putting on a light ore burden, three quarters ore to one fuel, and before furnace was full, the old troubles came back, and we decided to blow out.

The duration of the blast was 16 days, and the product was 80 tons gray forge, 20 tons mottled, and 76 tons white iron, total 126 tons, plus the scrap, which was perhaps 20 tons more than used. Stock used was 295 tons coal, 134 tons coke, 365 tons ore, 175 tons stone. Of course, much of the cinder was high in iron also, and was saved. These results were so decidedly unsatisfactory that they seemed almost accidental, and it was therefore concluded to make another trial before abandoning the plan entirely, by blowing in a little differently. The furnace was again carefully filled, using a little more wood and considerable furnace slag with the blanks and charges. No slag had been used in the first filling. Blast was again put on August 13th, after turning well for 13½ hours natural draught, starting with 3300 feet of air blown through 3-inch instead of 5-inch nozzles. In four hours, the furnace was in precisely the same conditions as in the first blast at the end of four hours' blowing; and as the following twenty-four hours were only a repetition of the first blast in all respects, notwithstanding the changes made in blowing in, it was decided to blow out at once, as there could be no doubt then but what the plan, at least if not a success, was a successful failure.

"My thanks are due to Mr. Hartman, of Philadelphia; Mr. Rader, of Sheridan; Mr. Cook, of Warwick; Mr. Firmstone, of Glendon; and Mr. Boyer, of Columbia, for their support and assistance in the trial."

THE BLAKE SYSTEM OF FINE CRUSHING.*

By Theodore A. Blake, M.E., New Haven, Conn.

More than a quarter of a century has passed since the introduction of the machine known as the Blake crusher, the invention of Eli W. Blake, of New Haven, Conn.

Although originally designed for breaking stone for road-metal, its importance for crushing ores of the precious metals, and those of iron, copper, and zinc, as well as emery, phosphates, plaster, etc., was soon recognized; and for many years, its use has been world-wide and its construction so well known that no special description of it is deemed necessary.

Following its introduction, many different machines for the same purpose containing the same essential features of upright convergent jaws, one of which is movable with respect to the other, but having some slight modification of such movement (generally a rubbing motion) or of the non-essential method of imparting motion to one or both of the jaws, have been offered to the public for sale and use, but have as a rule in time disappeared from the market.

If we seek for the reason of the success of the Blake crusher, aside from its simplicity of construction, we shall find it in the adherence to the principle of crushing by simple pressure and careful avoidance of attrition. In this lies the economy of power and of wearing surfaces.

To reduce any hard and brittle material to a fine powder by many different methods—by attrition, impact, or percussion—is a comparatively easy matter; but to accomplish this by the employment of either of the above-mentioned principles involves such a consumption of wearing surfaces (generally iron) or of power that the numerous devices that have hitherto been presented to the public as solutions of the problem of fine crushing have proved utter and complete failures when tested with reference to the power employed and the wear of iron in doing their work.

Aside from the use of crushers, with the harder ores, the only two methods of fine crushing in general use, and, in the writer's opinion, worthy of consideration, are by means of stamps or rolls: the former doing their work by percussion, the latter by pressure, provided they are properly run and fed, but generally by pressure and attrition combined.

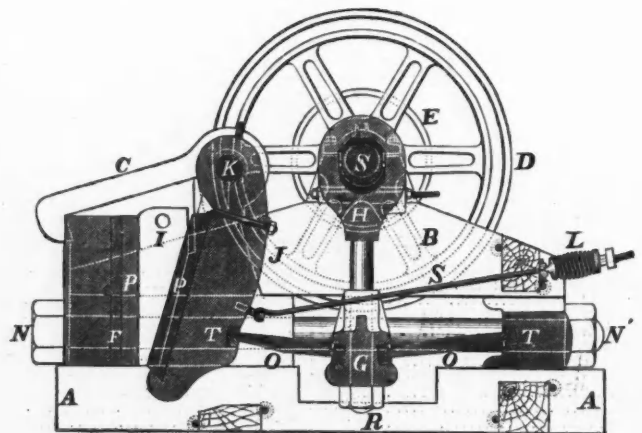
It is not proposed, within the limits of the present paper, to enter on a detailed analysis of the comparative economy of stamps and rolls. Of the greater economy of crushing with rolls, as compared with stamps, the writer has no doubt, provided the material to be crushed by the rolls is already broken to a small and tolerably uniform size before being fed to them, and the feed is uniformly distributed in such a manner as to avoid any accumulation of material between them. If fed with such materials, their tendency will be to wear evenly; and if accumulations of material between them are avoided, they will not be thrust apart, their product vitiated, and unnecessary power consumed.

In crushing either by stamps or rolls, efficiency largely depends upon the preliminary work with the crusher. To reduce any material fine enough to be fed to rolls, to secure the best economical results, it is necessary that it should be crushed to about corn-grain size, or say a quarter of an inch diameter. When ore is reduced to this size by a crusher, it is safe to say that from twenty to thirty per cent of it will pass a fifty or sixty-mesh screen, that is, a screen with from 2500 to 3600 holes to the square inch. If, then, so large a percentage of the material can, in a preliminary operation with crushers, be brought to such a fineness, why can not the whole be reduced to the same degree of fineness?

The great difficulties, however, in crushing fine with an ordinary Blake crusher have been: the liability of the material to pack in the jaws; and the greatly diminished product of the machine when the jaws are set so as to yield a fine product.

The solution of the problem of fine crushing will be found in making the discharging capacity of a Blake crusher, when set to crush fine, suf-

FIG. I.



ficiently great to permit the rapid discharge of the material as it is crushed. This requirement is fully satisfied by the writer's invention of the Blake fine or multiple-jaw crusher—a machine the value of which, when fine crushing is required, will, in the writer's opinion, prove to be as much greater than that of the ordinary Blake crusher as fine crushing is more difficult than coarse crushing.

In the Blake fine or multiple-jaw crusher, while the principle of crushing is the same—that is, simple pressure between upright convergent

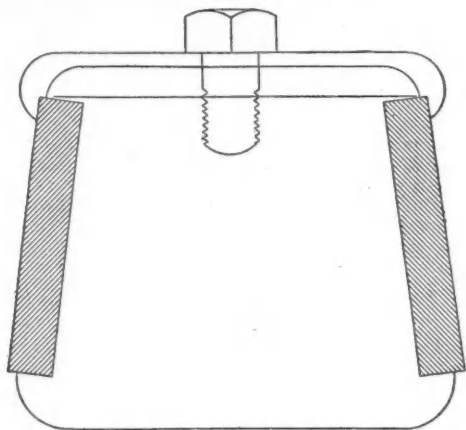
* Read at the Chicago Meeting of the American Institute of Mining Engineers, May, 1884. (Subject to revision. Transactions of the American Institute of Mining Engineers.)

jaws—the discharging capacity may be increased to almost any reasonable limit, even if the crusher is set to crush to a great degree of fineness.

The Blake system of fine crushing then consists in nothing more than the use of a series of crushers, beginning with one sufficiently large to receive the largest fragments and to give the required hourly or daily product, and ending with a fine or multiple-jaw crusher, from the products of which that which is sufficiently fine is withdrawn by screening or other methods of separation, and the coarse returned to the same machine to be still further crushed.

The following illustrations will serve to show the machines employed, and the system:

Fig. 1 shows the latest and best form of Improved Blake Challenge



SECTION FULL SIZE
FIG. 3

Breaker—a construction that has proved of great and substantial value, not only on account of its sectional character, but also by its power of resisting the enormous and sudden strains to which it is often subjected.

Fig. 2 represents a Blake fine or multiple-jaw crusher, with seven-jaw openings, each twenty-four inches by half an inch, equivalent to a single crusher with jaw-opening or receiving capacity two hundred and twenty-eight inches by half an inch.

Fig. 3 shows a full size cross-section of one of the series of sliding jaws in a 24-inch fine crusher, with plates of 1½ by ¼ inch tool-steel for wearing surfaces.

Fig. 4 is a longitudinal elevation of one of the series of sliding jaws in the same machine—one eighth full size.

It will be seen that the crushing is done between a series, in this instance, of sliding jaws supported by and sliding upon the main tension-rods or both. These jaws are separated by and held by rubber rings placed between them on the tension-rods.

The method of imparting motion adopted is the same as in the regular Blake crusher, by means of the toggle-joint, pitman, and eccentric shaft. The revolution of the shaft, bringing the toggles more nearly into line, throws the main sliding jaw forward, thus compressing the whole series of sliding jaws, the crushing pressure being transmitted through the material to be crushed, with which the jaws are supposed to be filled.

It is evident that, if a piece of iron or steel should by accident get into one or more of the jaws, the only result would be to render that jaw for the time inoperative, the motion that it would have with respect to the next succeeding one being taken up and distributed through the other jaw-openings.

Fig. 5 is a sketch illustrating the Blake system of fine crushing. In this series, the first or single-jaw crusher is a 10 by 7 improved Challenge. The second machine, to which the product of the 10 by 7 goes by

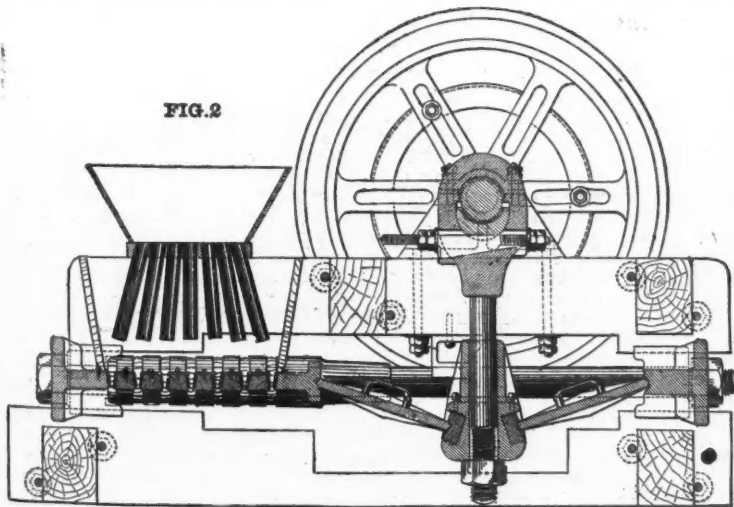


FIG. 2

gravity, is a multiple-jaw crusher, with three openings, each twenty by two inches. The product of the second crusher, reduced to corn-grain size and dust, is elevated to a screen with holes of required fineness, and then screened, the coarse going by gravity to a (24 by ½) 7 fine crusher. The product of the fine crusher goes by gravity to the same pit, and is elevated and screened, the coarse returning to the fine crusher to be again crushed. In this way, the entire mass of material may be reduced

to almost any degree of fineness, the services of but one man to feed the first machine being necessary. The crushing may be either wet or dry.

It will be seen that, in the above-described plant, as the fineness of the ore increases, we increase the discharging capacity. Beginning in the series with a discharge width of ten inches, we jump, in the second

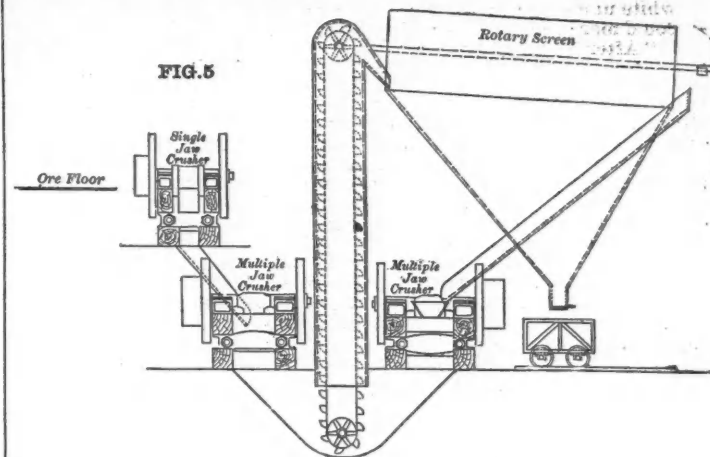


FIG. 5

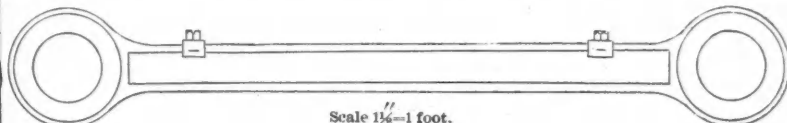
machine, to sixty inches, and in the third to one hundred and sixty-eight (168) inches.

The number of single-jaw crushers to be employed in a series may in some cases, of course, be increased with advantage. The product of a 20 by 15 may pass to a 30 by 5, and so on, the discharge capacity rapidly increasing; and any number of fine and multiple-jaw crushers may be employed.

We have in the Blake system, then, a system of crushing with crushers alone, and in the new multiple-jaw or fine crusher the old Blake crusher over again, so far as the principle of crushing is concerned, with an entirely new and completely effectual provision against breakage, due to the multiplicity of its jaws.

The results already attained have been so remarkable that the writer thinks it perfectly safe to assert that the problem of fine crushing has been by this invention completely solved; that the days of the old stamp mill for ores of the metals and the burr stone for phosphates and cements are practically numbered; and that they will shortly be replaced by a machine quite as simple and even more durable than the original Blake crusher, which was intended and is invaluable for spalling or reducing ores to a size suitable for further reduction by other means.

The first example of the Blake system is to be found at the works of the Chateaugay Ore and Iron Company, near Plattsburg, New York, of which Mr. A. L. Inman is the general manager, where the writer designed and placed a crushing plant of the capacity of two hundred tons a day, from 10 inches to a size to pass a ¼-inch round hole. The works were run continuously day and night for six months, giving even an excess of the daily product required, but are now idle on account of the dullness of the iron market. The ore is magnetic iron in grains dissem-



Scale 1/8"=1 foot.

FIG. 4

nated through a tough feldspathic gangue. Works for the same company of a capacity of 1500 tons a day are in contemplation.

The second example is at the works of Messrs. George H. Nichols & Co., or Laurel Hill Chemical Works, of which Mr. J. B. F. Herreshof is the manager, where a small plant consisting of one 10 by 4 improved Challenge and one (24 by ½) 7 multiple-jaw crusher, was put in to crush copper matte. The requirements were one ton an hour to twenty fine. The machines replaced an 8 by 12 Dodge crusher and a pair of 24 by 12 Cornish rolls, of which the product was but about 500 pounds an hour to twenty fine; while the product of the Blake system, with machinery about one third the weight, was 3000 pounds an hour, with an expenditure of less than one third of the power required by the crusher and rolls.

The third example is at the works of the Orford Copper and Sulphur Company, Bergenport, New Jersey, where a duplicate plant to that of No. 2 has just been installed. Other plants for gold ores, phosphates, etc., are now on the way to destination for installation.

The results attained have already assumed such importance that I have deemed it desirable to announce to the members of the Institute the introduction of this new machine. I hope, before long, to give them the results in a more complete form, with comparisons of other methods of crushing, based on actual and accurate statistics.

UNITED STATES ELECTRICAL CONFERENCE AT PHILADELPHIA.—The United States Electrical Conference convened September 15th for the last time. Protection from lightning was one of the subjects considered, the general deduction being that lightning-rods were essential to safety of houses in latitudes liable to storm. The conference then adjourned subject to the call of the chairman, Professor Rowland, of Johns Hopkins University. The electricians who attended the conference have gained so much by the interchange of ideas on subjects to which they had given special study that they were not willing to disperse without providing for another meeting. The called session will probably be held early in December, if not before, and will doubtless press on the attention of Congress the importance of establishing a national bureau of standards of electrical measurement.

AMALGAMATING MILLS.—IV.*

ROASTING-FURNACES.

SYSTEMS OF FURNACES.—There are many different kinds of furnace in use for chloridizing ore. Among the more common types, may be mentioned the Howell, Brückner, White, Stetefeldt, O'Harra, and ordinary reverberatory. The Howell, Brückner, and White furnaces are revolving cylinders. The axes of the Howell and White furnaces are at an angle of a few degrees to the horizontal, the ore being fed at the higher end and discharged at the lower. In the White furnace, the ore and the flame from the fire-box enter the furnace together at the higher end. In the Howell, the ore is fed in at the higher end and the flame enters at the lower. This constitutes the material distinction between these two furnaces, and the difference is in favor of the Howell. The Brückner furnace is a cylinder of boiler-iron, with ends usually made of the same material, though sometimes they are of cast-iron. In the center of each one of these ends or heads, there is a hollow trunnion, through which the flame enters or passes out of the cylinder. The axis is horizontal, but, like the Howell and the White, the furnace revolves on a series of wheels or rollers. The motion is conveyed to all these furnaces by a system of gearing, a belt of cogs passing around the outside of the cylinders, which gears with a small spur-wheel on a counter-shaft below the furnaces. By an improvement in the gearing of the Brückner, the speed may be varied from zero to six revolutions a minute, according to the requirements of the roasting process. In the Brückner furnace, the charge of about 3000 pounds is introduced through a door in the cylinder, placed half-way between the two ends, which is closed by means of a clamp. These furnaces are also constructed with two doors opposite each other. A characteristic feature of the Brückner cylinder is the diaphragm, which consists of iron plates about one inch thick fastened to tubes passing through the cylinder at right angles to its axis. The plane in which these tubes are placed makes an angle of about 30 degrees with the axis of the cylinder, so that the line where the plates and cylinder join is an ellipse. This diaphragm extends to within 18 inches of each end, and when the furnace revolves, it induces a circulation of the pulp from one end of the cylinder to the other. Although this diaphragm gives an almost perfect motion to the ore, it has several disadvantages, among which are the following: The cast-iron of which the plates are composed is corroded by the action of sulphur and chlorine, and the lively motion conveyed to the pulp causes a great portion of it, sometimes as high as 30 per cent, to be carried into the dust-chambers. A great part of this dust, too, leaves the furnace before it has had time to be roasted, and thus escapes decomposition altogether. In consequence of these disadvantages, the diaphragm is now usually omitted. Although the furnace, as at present constructed, does not chloridize to quite as high a percentage as it would if provided with a diaphragm, it has been proved to be far better suited to the economical working of ores. When the charge has been properly roasted, it is discharged through the doors by opening them and revolving the cylinder. As these furnaces are at present built, the speed can be increased, when it is necessary to discharge, by introducing a gear-wheel of larger diameter than that which ordinarily gives motion to the furnace.

The Stetefeldt is a high-shaft furnace, into which the flame enters from two fire-places on the sides at the bottom, the ore, mixed with salt, being fed into it at the top. The fumes and dust pass out through a flue at the top, descend, and, after passing through the flame of a smaller auxiliary fire, are conducted to the dust-chambers, whence the fumes escape through the stack. The ore occupies only a second or two in passing through the flame, but it is retained in the heat at the bottom of the furnace three quarters of an hour before drawing the charge. The auxiliary fire has also been applied in connection with the revolving cylinders, and with good results.

The reverberatory furnace, as applied to the chloridation of silver ores, has sometimes one hearth, and sometimes two or three hearths. Where several hearths are used, the ore is first put into the one nearest the flue, and, after roasting a time, is raked to the next, and finally to the last, near the fire-place. Thus, in a furnace with three hearths, there are always three charges in different stages of roasting.

The O'Harra furnace is a brick double-deck reverberatory furnace, 9 feet high, 8 feet wide, and 60 feet long, in which the ore is stirred by scrapers or hoes attached to an endless chain moved by the mill machinery. The two hearths are level, one above the other, and 47 inches apart (arches 10-inch spring), 60 feet long, and only closed at the ends by hinged sheet-iron doors. These doors close the furnace so that the draught is not injuriously affected, and also enable the scrapers to pass under them readily. There are four fire-places, two on each side, so arranged that all may be used to heat the lower hearth, or two of them may heat the upper hearth. The draught is through a stack connecting with flues from the arches over the hearths. The endless chain passes over both hearths in opposite directions and over a pulley at each end of the furnace. To one of these pulleys, power is transmitted by spur or friction gearing. To the chain, at equal distances apart, are attached two scrapers. Each of these carries 14 hoes—plates of wrought-iron about the size of a hoe—which are dragged along the hearths through the ore. These hoes are set at a slight angle with the chain, thus moving the ore somewhat forward as well as turning it over. The hoes of one scraper are set in a reversed position from those of the other; thus the ore is not pushed to the center or sides of the hearth, and the furrow made by one scraper is filled by the next. As the links of the chain and the scrapers are cooled by passing from one hearth to the other through the outer air, they are but little attacked and last for months.

It is not absolutely necessary to line any of these furnaces with fire-brick, but it is always best to use fire-proof material in the neighborhood of the flame. As a rule, fire-brick are much harder than ordinary brick, and for that reason are better suited to stand the wear and tear of a revolving furnace. There is not much difficulty in keeping the brick in place in the Howell and White furnaces, their diameter being small; but with the Brückner it is otherwise. The large diameter of this furnace causes the arch to be insecure unless the brick are good and are put in very tightly. A very good method of increasing the security of the lining is

to divide the circular arch into four parts by running flanges of boiler plate the length of the cylinder, thus making four independent arches. For this furnace, it is cheaper in the long run to use the best fire-brick and as little clay as possible. Salt and ashes are said to make a very good mortar for laying the bricks in place, and they certainly form a mortar that does not contract on being exposed to heat. The heads of the Brückner furnace are usually lined with the best fire-clay, tamped around and over projections of iron, or large brick are molded in the form of segments of a circle and fastened to the heads by clamps and bolts.

STATISTICS.—Of the ninety-five roasting-furnaces reported, eighty-nine were in use during the census year. More than one half, fifty-seven, are of the cylinder type, while twenty-nine are reverberatories, and nine are shaft furnaces.

DIMENSIONS OF FURNACES.—The dimensions of the Howell furnace are as follows: Length, from 16 to 27 feet; inside diameter, from 24 to 38 inches. The furnace is made in several sections, which are bolted together. Formerly, the two sections near the fire-place were made larger than the others, and were only lined with brick. It has been found good policy, however, to make all the sections of the same diameter, and line the cylinder with brick throughout. The White furnaces are usually shorter than the Howell, and of greater diameter, and are lined throughout their whole length. The bricks forming the linings of these furnaces are usually set on edge. The Brückner cylinder is usually 12 feet long and 5 feet in diameter inside, the bricks being laid flat. Some furnaces, however, have been constructed for the Aetna Company, at Galena, Nevada, 16 feet long and 6 feet 6 inches in diameter. These furnaces are provided with four discharge-holes. The Stetefeldt furnace is built of different sizes. The shaft proper is usually between 30 and 40 feet high. The usual size for a reverberatory furnace-hearth is 12 feet square, the arch being made low, in order to keep the flame as near the pulp as possible, but they are sometimes much longer.

In the Howell furnace, the discharge end is from 7 to 10 inches lower than the feed end. The cylinder is geared to make from three to six revolutions a minute, according to the diameter of the furnace, the angle of the incline, and the character of the process. The less the diameter, the greater should be the speed. These furnaces are now arranged so that the speed can be increased or decreased at will, so as to vary the length of time that the ore requires to pass through. By decreasing the speed, the ore is retained longer in the furnace, thus facilitating the working of baser ores. The Brückner cylinder ought to be geared so as to make one revolution in from two and a half to three minutes if 5 feet in diameter, or one revolution in four minutes if of the larger size, 6 feet 6 inches in diameter.

REPAIRS.—Neither of the cylinder furnaces requires frequent repairs if the lining has been properly secured. The Stetefeldt shaft-furnace, when built of good material, seldom gets out of order, and repairs may be limited to an occasional renewal of the brick in the fire-places. The repairs needed in a reverberatory furnace depend on the fire material used in building it, on the form of the arch (flat arches being more liable to fall in than round), and on the care with which it is anchored. Generally these furnaces last for years, but slight patching here and there being required.

CAPACITY OF THE DIFFERENT FURNACES.—The Howell, the White, the Stetefeldt, and the reverberatories with several hearths or with a single very long one are continuous furnaces; the Brückner and the reverberatory with a single short hearth finish a given charge before a second is introduced. The capacity of the ordinary-sized Howell and White furnaces is from 10 to 15 tons, although over 20 tons are sometimes put through these furnaces in twenty-four hours, and at the Alexander mill, in Nevada, when working on ore containing most of the silver as chloride, a capacity of 50 tons was reached. The 12 by 5 foot Brückner cylinder will hold about two tons of ordinary ore, the amount put through in twenty-four hours depending on the time needed to roast, which is very different for different ones. A Brückner will ordinarily work six tons a day. The Stetefeldt furnace can work from 20 to 60 tons, according to its size, in a day, and the reverberatory furnaces from 1000 to 2000 pounds to the charge. The only O'Harra furnaces reported have a capacity of 20 tons each per twenty-four hours.

METHODS OF CONVEYING ORE TO FURNACES.—The usual way of carrying ore from the battery to the furnaces is by means of screw conveyors and elevator belts with sheet-iron cups attached. Sometimes cars are used for this purpose.

METHODS OF FEEDING ORE INTO FURNACES.—In the Howell and White furnaces, the ore, mixed with salt in the battery or after crushing, falls from the elevator into a chute, which carries it into the upper ends of the furnaces. For the Brückner, the ore and salt are crushed in the battery together and conveyed to the hopper above the furnace, or the salt, having been ground fine in a mill or crushed by a separate battery, is added after the charge is partially roasted. At the Custer mill in Idaho, the salt is pulverized separately, but is added with the charge of ore. The same methods are used with the reverberatory furnaces, and in the Stetefeldt, the feed of the ore and salt is regulated by mechanical appliances, so that the supply of each entering the furnace can be adapted to the necessities of the ore.

MANIPULATIONS IN ROASTING.—In the ordinary reverberatory, the work to be done consists in raking and hoeing the ore from the flue end of the furnace to the fire-bridge and back and forth, so as to expose every particle first to the oxidizing influence of the air and then to the chloridizing effect of the decomposing salt. The quality of the roasting depends almost entirely on the care and diligence with which the manipulation is performed. After the roasting is completed, the ore is raked from the furnace to the cooling-floor and there sprinkled with water, either immediately or after an interval. In the Stetefeldt, every three quarters of an hour the door at the bottom of the shaft-stack is opened, and the ore that has collected at the bottom is drawn out upon the cooling-floor and sprinkled. In the Howell furnaces, the ore falls from the lower end of the cylinder into an iron box set in a chamber between the fire-box and the furnaces, and closed by iron doors. When the box is full, the doors are opened, and it is swung by means of a crane out upon the cooling-floor and dumped. It is then replaced, and the doors are closed. A simple brick oven may be substituted for this movable box.

When the charge in the Brückner is completely roasted, the furnace

* From the Census Report by G. F. Becker and S. F. Emmons. Compiled chiefly by Mr. J. S. Curtis.

stopped, and, the discharge-doors having been opened, it is again put in motion, and as the cylinder revolves, the ore falls directly on to the cooling-floor. It is almost completely discharged in ten revolutions, after which another charge is introduced.

Whichever furnace is employed, the product is, or should be, the same. The color varies from a light reddish-yellow to a dark brown, its shade depending on the amount of oxide of iron. It should have a light, porous, and woolly appearance, and when horned out should show no sulphurets.

TEMPERATURE MAINTAINED.—In the Brückner and reverberatory furnaces, after the desulphurization of the ore, which requires from two to eight hours, the temperature is raised and the chloridation period begins, which lasts from two to four hours. In the other furnaces, with one exception, a uniform temperature, about a cherry-red, is maintained at the fire-bridge, the ore being exposed to higher and higher temperatures as it passes through the furnace. In the original White furnace, the ore is heated to the highest temperature at the point of entry.

TENOR OF ORE TO BE ROASTED.—Silver ores that require roasting before they can be amalgamated are of very varied composition. There are some ores that contain so little sulphur that only an incomplete chloridation is obtained unless sulphur, either in the form of brimstone, or iron pyrites, or of copperas, is added before the ore is introduced into the furnace, sulphur in some form being necessary for the decomposition of the salt and the liberation of the chlorine. There are other ores, on the contrary, that contain so much sulphur in the form of sulphides that a long oxidizing-roasting is necessary before they can be prepared for chloridation. The typical roasting ore is quartz containing silver minerals and from 10 to 15 per cent of iron pyrites, with a slight admixture of copper sulphides. Calc-spar, braun-spar, and fluor-spar, if present in any quantity in an ore, retard the chloridation, as they absorb a large part of the sulphuric acid. Arsenic and antimony minerals increase the loss of silver by volatilization. Zincblende requires a long oxidizing-roasting to convert it into sulphate, and then a high temperature must be maintained before it will decompose the salt. Where there is a large amount of zinc in the ore, the chloridation is an imperfect one. Lead and copper contaminate the amalgam and bullion. All these minerals involve the use of a large percentage of salt in roasting, but, if present in only small quantities, they do not perceptibly affect the chloridation. In mixing ores, the sulphur and the silver contents of the charge are kept at those percentages that have been determined in actual practice to be the most favorable under the circumstances to the chloridation of the silver. The effort made to obtain rational rules as to the most expedient relations of silver, sulphur, salt, etc., was a failure, most of the managers having determined their mixtures empirically and knowing nothing definitely of the percentage composition of their ores. The richer and baser the ore, the more salt it requires.

DURATION OF THE ROASTING PROCESS.—In the Howell and White furnaces, the ore is exposed to the flame from seven to twenty minutes; in the Brückner and the reverberatory, from five to twelve hours; and in the Stetefeldt, it is about two seconds falling through the flame, and remains forty-five minutes at the bottom of the furnace.

OXIDIZING ROASTING.—When ores contain much arsenic and antimony, much salt is saved by exposing them to a preliminary oxidizing-roasting. This may easily be done in reverberatory or Brückner furnaces; but in the Stetefeldt, Howell, and White furnaces, it is not practicable. In roasting ores free from arsenic and antimony, there appears to be no advantage in delaying the addition of salt.

PERCENTAGE OF SALT USED.—When the salt is mixed with the raw ore, there is not much difference in the amount required to roast a given ore in any of these furnaces, but the Stetefeldt and the Brückner are supposed to require a smaller percentage than the others. From 3 to 15 per cent of salt, according to the character of the ore, are the usual limits, 8 per cent being the average. Salt is usually the chief item of expense in roasting ores, and mill-men frequently use more than the quality of the ore demands. They think it always best to be on the safe side, and by allowing a certain margin of excess, often considerably increase the expense.

WHEN SALT IS ADDED.—Generally, salt is added with the raw ore, although, in working very base ores in the Brückner and reverberatory furnaces, it is customary to add it at the end of the oxidizing period.

SULPHUR CONTENTS.—The percentage of sulphurets in roasting ores varies from 1 to 70 per cent. The closeness with which it is necessary to keep to a given sulphur content varies with the different furnaces. In the Stetefeldt, there is but little latitude, from 3 to 5 per cent sulphur being the limit. If this quantity will not liberate chlorine enough to chloridize the silver, the ore must be reduced in grade by the admixture of poorer qualities. In the White and the Howell, there are larger margins; and in the Brückner and the reverberatory, the very basest ores can be worked.

PERCENTAGE OF SILVER CHLORIDIZED.—The percentage of silver chloridized varies from 75 to 90 per cent in these different furnaces, it seeming to depend more on the character of the ore and the method of working than on differences of construction and manipulation. The difference in this respect is perhaps a little in favor of the Brückner and the reverberatory, as these furnaces permit of an oxidizing-roasting before the salt is added.

LABOR.—In all these furnaces, except the reverberatory, a man can roast five tons of ore per shift. One man can easily attend to two Brückner furnaces. In the reverberatory, it is fair work for one man to roast a ton per shift.

FUEL.—Wood is the fuel used in all these furnaces except in the Stetefeldt, where some charcoal is occasionally burnt. This wood is of many different kinds, and its value as fuel is chiefly governed by its weight. The different furnaces require on the average the following weights of wood to roast a ton of ore, the weights being calculated on the basis of 2200 pounds per cord as the average:

	Pounds.		Pounds.
Howell	300	Reverberatory	600
White	300	Stetefeldt	200
Brückner	90		

The Stetefeldt furnace uses less fuel than the others, because it is built solidly of brick and retains the heat better; the Brückner uses the most, because it is a large cylinder, and it is necessary to reheat it each time it is discharged.

POWER.—The power used to drive the mechanical furnace is estimated at about two horse-power for the Brückner and one and a half horse-power for the White and Howell furnaces.

LOSS OF WEIGHT OF ORE IN ROASTING.—The loss of weight of ore in roasting ranges from 3 to 15 per cent. Very base ores, of course, lose much more weight than freer ores. Leaving the sodium sulphate out of consideration, the tendency of the roasting process is to reduce the weight of the ore. The roasted product, as a rule, contains considerable quantities of soluble metallic chlorides and sulphates.

DUST-CHAMBERS AND FLUES.—The best arrangement of dust-chambers and flues is that of the Stetefeldt furnace. The system consists of a series of dust-chambers, sometimes as many as twelve, through which the dust and fumes pass, giving the dust an opportunity to settle, and of a long flue connecting with a stack, which is generally placed on a hillside at some distance from the furnace.* The dust-chambers nearest the furnace are opened several times a day, and the flue-dust is raked from doors at the bottom. The long flue is opened once in about six months, when the furnace is shut down. Two thirds of the flue-dust are deposited in the first two or three chambers.

The flues and dust-chambers of the other furnaces are arranged in a somewhat similar manner, except that they are not usually so complete. The dust-chambers are often placed under the dry-kiln, so that the heat from the furnace can be used to dry the ore, and the smoke-stack is often built in the mill itself, although it may better be placed as indicated in the preceding paragraph. The practice of placing the drying-kilns over the dust-chambers is to be recommended only when draught is cheaper than fuel, which, however, is usually the case.

AMOUNT OF FLUE-DUST CAUGHT.—The amount of flue-dust caught per ton of ore roasted depends on many circumstances, such as the character of the ore, its fineness, the style of furnace, and the draught. Those ores give the most flue-dust that, before they are roasted, are light and porous, and contain oxide of iron. The ores that give the least are hard quartz ores with sulphurets. Those ores that contain a large proportion of sulphurets do not, of course, need to be crushed as fine as those that contain little, the sulphurets being readily attacked by oxygen and chlorine when unprotected by a coating of minerals not affected by these gases. When there is no sulphur present, it is necessary to add it as pyrite, brimstone, or, best of all, as copperas. The ore should then be fine, to facilitate the immediate and complete action of the chlorine.

If the reverberatory furnace is properly handled, it produces the least flue-dust, for the motion of the ore is less violent than in the others. With care, in the reverberatory furnace, the amount of flue-dust can be limited to two per cent. From the nature of the Stetefeldt furnace, a considerable amount of flue-dust passes into the dust-chambers; but as practically all of it settles there, and as, owing to the auxiliary fire, it is chloridized to a higher percentage than the ore itself, this fact is of no importance. As much as 10 per cent sometimes passes over. This is also true of the Howell furnace, except that the dust is usually not so well settled as in the Stetefeldt. At the Grand Prize, in Nevada, the flue-dust chloridized five per cent higher than the ore itself, and at other mills this higher chloridization of the dust is very frequently the case. With the Brückner furnace, the amount of flue-dust is usually not large; but it is not chloridized as high as the ore, and sometimes requires a second roasting.

The draught in all these furnaces can be regulated by two dampers, one between the furnace and the dust-chambers, the other in the smoke-stack.

LOSS OF FLUE-DUST.—The actual loss of flue-dust is very slight with most ores where the furnace has plenty of dust-chambers and long flues, and it probably does not often exceed one per cent; but where the ore is very finely divided, even under favorable circumstances, this loss may reach five per cent. Extensive dust-chambers are usually desirable. As regards the loss of silver and gold by volatilization, no reliable data are available. That there is such a loss can not be questioned, but at present there is no accurate means of estimating it. Except with ores containing much arsenic, antimony, and zinc, it is probable that it never exceeds one per cent.

DIFFERENCE IN COMPOSITION BETWEEN FLUE-DUST AND ROASTED ORE.—Flue-dust is different in composition from roasted ore. It is lighter, and its color is usually a shade darker. It contains ashes and charcoal, as well as more of the base-metal chlorides than the roasted ore. It often contains fine undecomposed sulphurets. The flue-dust from the Stetefeldt and Howell furnaces is chloridized higher than the roasted ore. This is due to the action of the auxiliary fire through which the dust falls as it comes from the furnace. In some places, there is an arrangement by which a small percentage of fine salt can be mixed with the dust as it passes through the flame to assist the chloridation. The flue-dust from the other furnaces is chloridized lower than the ore, and, although the auxiliary fire has been introduced in the construction of Brückner furnaces, it has not been found to have the desired effect. In the Brückner furnace, the cause of this may be that the greater part of the flue-dust passes over into the chambers when the ore is first charged, and, as it is not at all roasted, the auxiliary fire is not capable of chloridizing it. The tail fire is more beneficial with continuous furnaces than with those that receive a charge at stated intervals.

DIFFERENT KINDS OF FURNACES AS COMPARED WITH EACH OTHER.—The principal advantages and disadvantages of the furnaces described may be briefly stated as follows:

The Howell, of all mechanical furnaces, is the one that is most easily handled. It is not an expensive furnace, and requires little power and few repairs. It has a continuous feed and discharge, which lightens the labor required. It is the furnace that, with the exception of the Stetefeldt, requires the least fuel to roast a ton of ore. Its flue-dust is chloridized to a higher per cent than the roasted ore, and, with the possible exception of the Stetefeldt, it requires less manual labor to run it. Like all continuous furnaces, it requires the ore to be crushed fine, and needs a large percentage of salt when the ore is light or at all base. These points, however, are not serious disadvantages. What prevents the furnace from being universally adopted is the fact that it is not available for the basest ores. The length of time during which a particle of ore is

* By thus taking advantage of the topography, the expense of a high stack is avoided.

exposed to the action of the flame and the air is short, though in the latest furnaces the time has been considerably extended. The reason that this furnace is not adapted to chloridize the basest ores is, that the period of oxidizing-roasting, which begins at the flue end of the furnace, is altogether too short to permit of any quantity of zincblende, galena, or other refractory minerals being oxidized, and they pass into the chloridizing portion before the metals are in a condition to combine with the chlorine gas. This defect of the furnace is of little importance as regards its availability in all cases where the ore is not of the very basest kind, and but very few of the ores of the Pacific coast are of such a character.

The White is a similar furnace to the Howell, and, except that the flame and the ore enter the cylinder together, there is no great difference in points of construction. As regards expense of building, power required to run it, repairs, continuous feed and discharge, and labor required in manipulation, what has been said of the Howell applies also to this furnace. The fact that ore and flame enter the cylinder together precludes the possibility of distinct oxidation and chloridation periods. It is necessary to crush the ore fine, and the flue-dust is not usually chloridized as perfectly as the ore, nor can the basest ores be worked in it.

The Brückner cylinder, like the reverberatory furnace, has the advantage that an ore which is in any way susceptible of chloridation, no matter how base, can be effectually chloridized in it, but, unlike the latter furnace, the efficiency of the work does not depend on the diligence of the roaster whose business it is to stir the pulp. It chloridizes to a somewhat higher per cent than the other mechanical furnaces, and requires less salt. These facts may be accounted for when it is remembered that the ore can be roasted sufficiently before the salt is added to form the sulphates necessary to the proper decomposition of the salt, so that, when that is added, nothing but an elevation of temperature is needed to complete the process. On the other hand, it is a furnace that in some respects is inconvenient to handle and that requires more power to drive, as the charge is a heavy one (from 3000 to 4000 pounds). The bricks forming the lining occasionally fall out, and the furnace needs, as a rule, more repairs than the others. It also consumes more wood, for reasons already explained. It is, however, the best mechanical furnace known for working very base ores.

The Stetefeldt furnace has the following advantages: Less power is required than for any of the other furnaces, and but few repairs are needed; it has a continuous feed and discharge; it requires the least fuel and the least labor per ton of ore roasted; and its ore and flue-dust are chloridized to a very high percentage. Its principal drawbacks are its original cost, for it must be built of good brick and well anchored, and the fact that the ore worked in it must have nearly a fixed percentage of sulphur and nearly a fixed value in silver to be well roasted. Very low and very high-grade ores can not, therefore, be worked to advantage. The loss of silver and of gold in this furnace is very slight, and where there is a large quantity of ore to be roasted per diem, and where the ore is uniform and of a suitable composition, this furnace is much to be recommended.

The reverberatory furnace does excellent work on all kinds of ore and admits of any necessary modifications in the process; but the fact that it involves so much manual labor, thereby making the process a very expensive one, prevents it from being employed in any but very exceptional cases. Its first cost, however, is much less than that of a cylinder or shaft-furnace, and also, of course, considerably within that of an O'Harra mechanical reverberatory. As the price of labor is nearly the same at points near main lines of communication and at localities far removed from them, while the cost of freight on the iron and the fire-brick involved in the construction of most of the furnaces increases very rapidly with the distance from the railroads, the reverberatory furnaces may often be the most economical in remote districts.

THE LAW OF THE APEX.*

By Rossiter W. Raymond, New York City.

(Continued from page 143.)

The Equator case was tried again in July, 1879, before Judge Miller and Judge Hallett; and the former instructed the jury that, as neither patent covered the apex of the lode, each including only portions of it, neither patentee had the right to follow the lode on its dip; but each would be confined to the portion of the vein included between vertical planes drawn through his boundary lines. I do not know whether this decision was published, and I am indebted for this brief summary of it to a distinguished member of the Colorado bar. Its practical effect would be peculiar. The accompanying diagram, Fig. 1, shows a general case, in which the outcrop of a vein appears in two parallel adjacent locations. According to this decision, the locator B, who has the hanging-wall, will obtain by far the larger part of the vein. Moreover, he can cross the line *bc* and work unmolested, in the ground *C*, unless some other locator has preoccupied it, which can only be done by the actual discovery of ore within it. Now, unless there be another deposit overlying the vein here shown, such a discovery can only be made by the sinking of a deep shaft in *C*, to strike this vein; and if B crosses the line before such a shaft has reached the vein, then B makes the discovery of ore in *C*, and can for himself locate the ground. Judge Miller's ruling, therefore, it will be seen, strongly favors the hanging-wall claimant, and may, under certain circumstances, give him practically the whole of the vein. Judge Hallett's previous ruling, on the other hand, would, as one of the counsel engaged in the case expressed it, "saw the lode into slabs," if there were parallel seams of ore in it that would permit such a division, such as *x, y*, Fig. 1.

According to my recollection—I have no report of the cases before me—rulings were made in Nevada by Judge Rising (May, 1881) and Judge Rives (August, 1881) in controversies between the Richmond and Albion mining companies, declaring in effect that the prior location, though it covered but a part of the width of the apex, would hold the whole vein on its dip. I think the tenor of the decisions of the State courts on the Pacific coast has been in the same direction. But perhaps

it would be more correct to say that the point has scarcely been contested outside of Colorado. The prior location has taken the vein as a matter of course. Under the law of 1866, or the miners' customs generally, the question could not arise. The right of discovery and prior location was too potent to permit such interference; and the lines of the surface location were relatively of much less importance. I can not help feeling

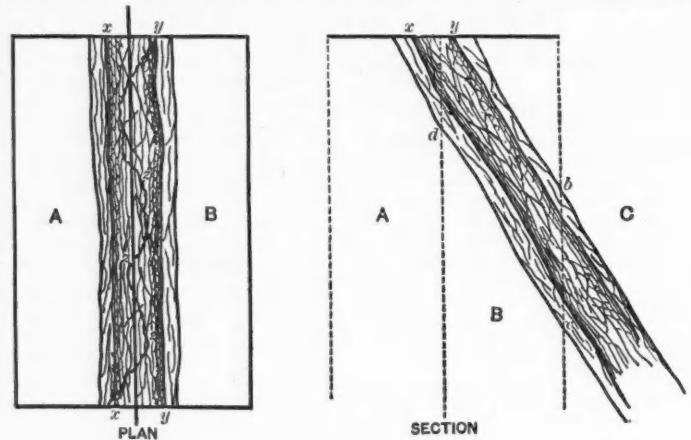


FIG. 1.

that this fact would considerably influence the Supreme Court in deciding this point—which will reach that tribunal sooner or later, and the sooner the better. The language of the statute, however, is pretty positive; and since the grant of the extra-lateral right is an extraordinary one, it is fair to construe its conditions strictly. Until the Supreme Court shall have settled it once for all, we may expect contradictory decisions in the courts below.

A way out of the difficulty suggests itself in the question whether the apex need include the whole vein from wall to wall. May it not be a line? Must it necessarily be a surface? In No. 4 of the comments quoted above from the ENGINEERING AND MINING JOURNAL, this question is answered in the negative. But the subject is not without great doubt. If the highest line along the vein be called the apex, then the mere projections of the outcrop—the last accidents of surface configuration—would determine its legal course, which might be as crooked as the line *z z*, Fig. 1.* This solution of the problem, therefore, though it would keep within the letter of the law and avoid the absurdity of a lode in which nobody has or could acquire the extra-lateral right, would be extremely difficult of application.

We have thus discussed four different solutions of the problem presented by two parallel adjoining locations, each containing part of the lode at the surface or apex. Either:

1. Each locator has the extra-lateral right upon his own seam within the lode; or,
2. Neither locator has any extra-lateral rights whatever; or,
3. The prior locator has the extra-lateral right; or,
4. The locator having the highest line along the vein has the apex, and hence the extra-lateral right.

There are two other possible solutions. Either:

5. The foot-wall location, or,
6. The hanging-wall location, takes the extra-lateral right.

In behalf of the fifth alternative, it might be urged, that the discovery of one wall in place is certainly enough to prove the lode in place, and that the foot-wall is the more likely to be in that condition near the surface, and to constitute, therefore, the clearer landmark for the true position, dip, etc., of the lode. Under a special statute in Montana (before the U. S. statute was passed), one wall determined the existence of a lode; and since the hanging-wall is more frequently indistinct or disintegrated than the foot-wall, it was the foot-wall which the miner most assiduously sought, and upon which he based his claim. Yet, no doubt, a prior discovery of the hanging-wall would defeat it.

Concerning the sixth alternative, I will merely remark that I have heard of one decision which adopted it; but I have been unable to get a report, or even a trustworthy account of it. According to the hearsay which constitutes, in this case, my only authority, a certain judge decided that in a case such as is shown in Fig. 1, the hanging-wall claimant would have the extra-lateral right on the lode, because his claim would at some depth or other (in Fig. 1, at *d* and below) contain both walls; whereas the foot-wall claim would never include the hanging-wall.

Of all these alternatives, No. 3 is undoubtedly the most desirable for the mining industry; and it is to be hoped that the Supreme Court will see its way to adopt it. This could perhaps most easily be done by a liberal construction of the word "within," as simply *not* "without," and by excluding the notion of a third position, neither within nor without the location, as defeating the manifest purpose of the law, and therefore absurd legally, however sound it might be logically.

Still another question may arise concerning the apex. Where a lode, in approaching the surface, branches, and the branches have their outcrops or apices within different locations, the prior locator is probably, under the act of 1872, entitled to the lode below the junction. (See section 14 of the act, or section 2336 of the Rev. Statutes.) For this statute has nothing to say about "dips, variations, or angles;" and under it the case described would probably be held to be the union of two veins. But the act of 1866 contains the phrase just quoted, and moreover clearly recognizes the existing customs of miners, by which "spurs" as well as

* Read at the Troy Meeting of the American Institute of Mining Engineers, October, 1883.

* This objection was clearly pointed out by Dr. Persifor Frazer, in a brief discussion of this paper at the Troy meeting. The paper was not read at that meeting in full—a comparatively brief oral statement of a portion of it only being presented; and the discussion is not reproduced here, because the written paper has been so far modified as to supersede it. I believe that the point here named is the only important one for which credit should be given in this connection.

"dips, variations, and angles" were generally included in the possessory title of the locator upon the main lode. In the case of mines located before May 10th, 1872, it might be a matter for legal decision, which apex was that of the main lode, and which of the spur or feeder. Eminent counsel to whom I have submitted this point, reply:

"It would be a question of fact to be determined by developments and expert testimony as to which claim was located on the lode, and which on a spur or feeder. That being determined, of course title to the lode carried the lode. The question would have to be decided by the jury, under the instructions of the court. The court would, of course, instruct the jury in effect, that whichever location they believed covered the principal lode would be entitled to hold it on its dip."

Even under the present statute, it is held by some that this question might arise, and that the relation of the two apexes, as main and subsidiary, might overrule the relation of the two locations in point of age. Without attempting to discuss the point fully, I will show by one or two instances how it might affect locators.

1. A finds a small vein, locates a claim upon it, and begins to work it. B, attracted by A's success, starts a shaft just beyond A's side-line, over the dip of this vein, and discovers the apex of another vein, on which he makes a later location. At the depth of a hundred feet, the two come together, and a jury decides that B's lode, having been the larger and more profitable of the two, is the main lode, and that poor A, who has pluckily followed his less remunerative vein from the surface, in the hope that it might improve in depth, must now lose it altogether, because it has improved so much! This is a hardship to A, who was the real discoverer, and would have developed the whole mine if allowed to go on.

2. A's vein, in the case just described, is the larger of the two, but much less rich. Geologically it was the main fissure; but the vein of B is commercially the main or only valuable lode. How shall the jury decide this?

3. A locates as before, but upon a defined lode, concerning his title to which no doubt ever arises. B makes a later location in the neighborhood, upon another lode altogether. In the course of working, it is found that B's lode receives, at the depth of 100 feet, a branch coming from and having its apex in A's ground. But this branch has never been discovered or worked by A. It is simply one of the "all veins, lodes, or ledges, the top or apex of which lies inside" his location. Here the giving of the lode below the junction to A on the ground of priority would be a hardship to B; and if the jury should pronounce the A branch a mere feeder, and the B branch the main lode, they would do substantial justice.

These illustrations might be multiplied; and the result would be to

was not the case, presumably on locations older than 1872; and the shape has been held not to void the patent.

Mr. Wrinkle, mining surveyor of Virginia City, Nev., submitted to the Public Lands Commission (*Report*, p. 432) the case illustrated herewith in Fig. 2.

The diagram represents the outcrop of a lode *LL*, dipping as shown by the arrows. On this lode, A makes the first location *aaaa*, and obtains the extra-lateral right between vertical planes drawn through *aa'*, *aa'*. The next location is made by B, who, however, prefers to draw his end-lines *bb*, inclined to the course of the lode, so that his boundaries *bb'* on the dip continually depart from those of A. Each of them has complied with the law; but when C undertakes to lay a third location between them, if he makes one of his end-lines coincide with the end-line *aa* of A, he can not, under the rulings of the General Land-Office, make the other end-line coincide with *bb*, the end-line of B, but must run it from the point *e* (the crossing of the lode with *bb*) in the direction *ef*, parallel with *aa*, leaving the triangle *f'e'b'*, which nobody can locate, although the claim of C may be much less than 1500 feet long. On this case, the following observations may be made:

1. It is not quite true that nobody can locate the triangle referred to. Whoever—B, C, or another, first finds ore, in the lode *LL* or any other lode, within the vertical planes *ef'*, *eb'*, can cover it with a surface location, which will simply lack the extra-lateral rights. This location may have a maximum size of 600 by 1500 feet.

2. If C's only recourse were to take the end-lines *aa*, *ef*, he would not be wronged; for his claim, at any level beneath the surface, would be just as long as it is at the surface. He would have everywhere the same number of feet on the lode.

3. But in fact, C has here the opportunity of doing better than this. He can draw an end-line *cc*, parallel to *bb*, and locate the claim *bbcc*. Then drawing through *g* (at the crossing of the lode) an end-line *dd*, parallel to *aa*, he can locate, or cause to be located, the claim *aadd*.* Then he will be entitled, under the first location, to the extra-lateral ground *bcc'b'*, and under the second, to *aadd'a'*; and the triangle *d'gc'* will be in the heart of his ground, where nobody can get access to it—provided the vein dips steeply enough to bring it, at *dc*, so deep that a vertical shaft to strike it would be an expensive work. If he can secure a surface claim, covering this triangle as far, for instance, as *d'* and *c'*, he is still further protected. Assuming the vein *L* to dip 45 degrees, and the width of the claims as shown in Fig. 2 to be the full width of 600 feet, the vein at *d'* and *c'* would be nearly 900 feet vertically below the surface. C would thus possess, practically, the extra-lateral right bounded by *abb'a'*, or a longitudinal extent of the lode increasing with

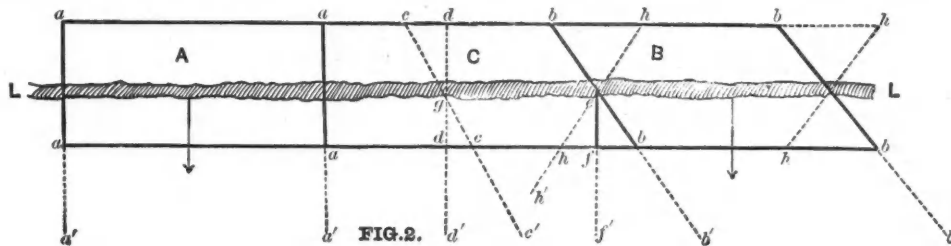


FIG. 2.

show that the hardship would be sometimes on one side, sometimes on the other. We may say, however, that there is less real ground of complaint when the principle of priority is made the basis of title than under any other theory of the mining law. The golden rule for courts and juries might well be, "When in doubt, give the disputed ground to the prior locator." For this rule there are two general reasons:

1. It recognizes the merits and claims of discovery and pioneer exploration, which are essentially among the oldest and deepest foundations of property rights.

2. It involves the minimum of uncertainty and injustice, because the subsequent locator is warned beforehand, and makes his claim, conscious that it is subject to the prior rights. Hence he can not claim that he has been surprised or wronged.

III. THE COURSE DOWNWARD.

A very important question may arise, as to whether the "course downward" of the law must be the true dip, which, as mining engineers are aware, is the inclination in degrees below the horizontal of the steepest line drawn in the plane of the lode, or the intersection of the plane of the lode with a vertical plane at right angles to the strike.

The act of 1872, by the peculiar form of its extra-lateral grant, already discussed, has laid the main emphasis upon the end-lines; and the dip has become relatively unimportant. But the end-line problems are yet far from settled. Many of them have scarcely been attacked; and in some of them it may be that the proper meaning of the "course downward" may reflect light upon the proper position of the end-lines.

Up to the present time, however, there has been but one point decided with regard to the course downward, namely, that it is the general inclination of the lode entering the mass of the earth; that it includes local rolls and variations even when they are so extreme as to give the lode temporarily an actual upward course; and that it may be said to "depart from the perpendicular" when it approaches, without completely reaching, a horizontal position. I will not stop to quote authorities; these decisions are obviously just. But they do not settle the question whether (even if the true dip must be followed) the local dip at the point of discovery, or the local dip at the end-line, or the average of the two dips at the two end-lines, or the average dip throughout the claim, or the average dip of the whole lode so far as it can be traced, must be followed.

IV. THE END-LINES.

The statute, while giving to the end-lines of the location absolute controlling importance, does not prescribe their direction. It barely directs that they shall be parallel, without fixing any penalty. The requirement of parallelism has usually been enforced by the Land-Office; but patents have been granted (see the Eureka case, already quoted) in which this

depth. If, however, instead of the case which Mr. Wrinkle supposes, the location of B had the boundaries *hhhh*, it is easy to perceive that C could in no way avoid the cutting off of his claim in depth, by the intersection of *hh'* and *aa'*.

But these and other similar problems are among the simplest, because they assume the apex to be in the line of the true strike—that is, the direction of a horizontal line midway between the walls of the lode—and to be crossed by the end-lines of the location, the side-lines of which would, therefore, be parallel with the strike of the lode. More complicated questions arise when the true course of the lode is curved or crooked, or the outcrop, not being level, is not in the line of strike, or the outcrop or apex crosses one or both of the side-lines.

To take the last condition first, it was the general custom of miners before 1866, that a location held the designated number of feet along the lode, whether the notice and surface monuments correctly showed the strike or not. The miner had the right to "swing his location," and take the full length of his claim, without regard to the claims of subsequent locators. The lode was the main thing located and claimed. Under the law of 1866, it was agreed that the same right continued, even after the issue of a patent. The law, it was urged, was intended not to curtail, but to confirm, the rights of miners, and hence patents granted under the law of 1866, or under the law of 1872 on locations previously made, would not confine the patentee to the length of lode actually covered by his surface-lines. The Emma-Illinois case in Utah, and several *nisi prius* decisions on the Pacific slope sustained this view. But it was overturned in Colorado by Judge Thatcher, in the case of Wolfy and Skinner vs. the Lebanon Mining Company (Bell Tunnel-Ben Harding case) reported in 4 Colorado, 112. Carpenter (*Mining Code*, 3d ed., p. 63) gives an abstract, from which the following portions are quoted:

"The evidence tended to show that the Ben Harding lode, in its general course or strike, departed from the vertical side-lines of the location as described in the patent, and entered the Bell Tunnel lode location, which was also patented. At common law, a grant of land carries with it all that lies beneath the surface to the center of the earth. This rule, except so far as modified by statute, must extend to the plaintiff's patent. There may be a grant of the mineral, separate from the surface of the earth. The Ben Harding patent must be construed under the act of 1866. . . . The claimant is required to file in the Land-Office a diagram of

* Under the law of 1866, not more than one location could be made on the vein by the same person. There is no such restriction now; and if there were, it could as easily be evaded as formerly, when, by the convenient device of locating different claims in the names of friends, and taking immediately quit-claim deeds from them, a man could practically acquire as many feet as he desired. But for the purpose here in view, it might be better that the two claims of C should be in different names until the patents had been issued. It should be added that under the present law a separate discovery is required for each claim.

his vein or lode. This is his own act. Before making such a diagram, the law contemplates that he shall so far expose and develop the lode as to be able to trace its course. If the plat made by the surveyor does not cover the lode, he will not be permitted to shift his lines so as to include the lode. The error is his own, not that of the government officer who acts under the direction of the claimant. However tortuous might be the course of the lode, the claimant has a right to follow it up and prepare his diagram so as to include it. There are no words in the act which require the diagram to be in the form of a parallelogram or any other particular form. The act requires that there must be a discovered lode, whose locus must be embraced in the limits of the diagram. The surface ground and the lode are not independent grants. It is not the purpose of the law to grant surface ground without a discovered lode. The lode is the principal thing, and the surface-ground incident thereto.

"In conveying a segment of the earth located under the provisions of the act, it is the intention of Congress to convey a mine contained within that segment as the substance of the grant. The act appeals to the industry of the miner to make sure that the lode is within his location. The higher his diligence, the greater his reward. If by lack of care he makes a location not embracing the lode he seeks to secure, he can not be heard to complain because others have explored and occupied the adjacent territory containing the claim he might have embraced in his diagram. If, as the evidence tends to show, the Bell Tunnel lode is but a continuation of the Ben Harding lode (after its departure from the vertical side-lines), extending through the adjacent location, there is no principle of law or justice, in the absence of an express statutory provision, by which the patentee of the last-named lode can encroach upon the premises embraced by the Bell Tunnel lode location, and deprive the owner thereof of the fruits of his discovery. Before a claimant is entitled to a patent under the act of 1866, he must comply with all its provisions, the leading object of which is to require that the claimant, before applying for a patent, shall ascertain the exact location of his lode and fix by his diagram that location, so that the public may be apprised of its limits and may thereafter with safety explore and occupy adjacent tracts. It is insisted that, if not by the terms of the act of 1866, then by virtue of territorial legislation and local customs and rules of miners, the patentee of the Ben Harding lode was entitled to follow the course of the discovered lode beyond its own side-lines, and that the act of 1866 was to recognize and confirm these rules and customs. The act confirmed such legislation of local rules, so far as the same may not be in conflict with the laws of the United States. The acts of Congress are paramount to all local laws, and the patentee takes under the laws of the United States. The right of the locator to the possession of his claim and to appropriate to his own use the mineral deposits therein under the acts of Congress, is full and complete, and he need not take steps to obtain a patent for the land.

"There is no time prescribed in which he shall apply for the patent. Ample time is given to ascertain the precise situs of his lode, with reference to adjacent land. The surface and the lode are both the subject of the grant. The patent operates to convey, not only the circumscribed tract of land, but also the lode contained therein, with the right to follow the same in its downward course into adjoining premises, but not to follow it when in its general strike it departs from the vertical side-lines. In the latter case, after its departure, it is the subject of location by whomsoever it may be discovered. If then, as the evidence tends to show, the ledge on which the Ben Harding lode was located deflected in its general strike from the patented side-lines, the patentee is not entitled, in virtue of his patent, to its possession beyond the side-lines, as against one who has subsequently located it and patented it."

(TO BE CONTINUED.)

THE OCCURRENCE, LOCALITIES, AND OUTPUT OF THE ECONOMIC MINERALS OF CANADA.*

By William Hamilton Merritt, F.G.S., Assoc. R.S.M., Etc.

Thinking it might interest some members of the Association, I have endeavored, in a short time and imperfect manner, to put together a few facts concerning the occurrence, localities, and past year's output of the economic minerals of Canada. Most of the localities and occurrence of the minerals are taken from the maps of the Geological Survey. The exact amount of minerals raised can not be obtained, but the total value of minerals exported in 1883 was estimated at \$3,166,830. This amount is obtained from the exports shown in the trade and navigation returns, from which source and from the annual mining report of Nova Scotia I have derived the tonnage of each separate ore raised in 1883 and mentioned below.

We unfortunately have not the same reliable statistics and reports of our mines and minerals that are enjoyed by most countries, and which in England are compiled by the Home Office from the reports of the inspectors of mines. The provinces of Nova Scotia and British Columbia have mining departments, and issue annual mining reports, and the former province especially does much to encourage mining industry. Throughout the whole of Canada, however, mining may be said to be yet in its infancy; and in the country at large, comparatively little attention has been paid to mineral development, principally through lack of capital, notwithstanding that the indications and specimens obtained of valuable ore are numerous and wide spread, from Newfoundland to British Columbia.

Viewing briefly the mineral yield of each province for the past year:

Nova Scotia.			
Coal.....	1,422,553 tons.	Used in Canada and shipped to U. S.	
Gold.....	15,446 ounces.	Sent to U. S.	
Gypsum.....	144,668 tons.	Chiefly shipped to U. S.	
Iron ore.....	52,410 "	Used in Canada.	
Manganese.....	150 "	To United States.	
New Brunswick.			
Coal.....	17,670 tons.	Manganese.....	1066 tons.
Gypsum.....	15,742 "	Plumbago.....	1 0 cwt.
Lead.....	2 "	Antimony.....	368 tons.

As is shown by the above, coal, gold, gypsum, and iron are the principal

* Read before the British Association Meeting at Montreal.

sources of mineral wealth to the Maritime Provinces. Most of the coal and iron is used in the country, and the gypsum is chiefly shipped to the United States.

Quebec.		
Copper.....	4,402 tons.	Iron.....
Silver.....	78 "	Gold.....
Phosphates.....	14,268 "	

In Quebec, alluvial gold occurs in quantity along the Chaudière and Du Loup rivers, and it is worked vigorously in a few places. Copper, antimony, and asbestos are worked in the eastern townships; but the most actively prosecuted mining industry in this province is the extensive development of the apatite beds in the valley of the Ottawa. The Hull iron mine in this region has yielded a large amount of fine magnetic iron ore.

Ontario.		
Iron.....	42,745 tons.	Salt.....
Silver.....	22 "	Apatite.....
		197,159 tons.
		220 "
		Petroleum (crude), about 15 million gallons.
		Gypsum, about 7000 tons.
		Of Gypsum, 986 tons were exported to the United States.

The iron is chiefly worked in the vicinity of Madoc and Kingston, and is shipped to the United States. It is expected this mining industry will be very largely developed. The salt is worked near Goderich, on Lake Huron, and the gypsum on the Grand River.

In the vicinity of Petrolia, petroleum has been obtained for many years.

In the Lake Superior region, renewed activity is expected on its numerous mining locations. Silver and copper are worked there to some extent. At Jack Fish Lake and the Lake of the Woods, mining has begun on gold-bearing quartz veins.

In the Northwest Territories, lignite coal-seams are opening up to a considerable extent. In the Rocky Mountains, alluvial gold has been worked since 1858, and the yield last year was valued at \$631,648. The total amount mined up to the present is some \$60,000,000. Specimens of rich silver copper and mercury ores are reported to have been found, but little work has yet been done.

On the Pacific coast, anthracite and bituminous coal is operated, and 193,485 tons were exported last year to the United States principally, some 8000 tons to China, and about the same amount to the Sandwich Islands. To the United States, 1890 tons of iron ore were exported.

The geological formations in which some of the most important mineral occur, and the districts in which they are found, as shown in our geological map, are as follows:

IRON ORE.—Rocky Mountain District.—In three localities in the Paleozoic and in two in the Tertiary.

Great Plain.—In one locality each in the Tertiary and the Cretaceous.

Lake Superior District.—In one locality in the Laurentian; in one at the junction of the Laurentian and Nipigon; in one at the junction of the Huronian and the Nipigon; and one in the Devonian.

Lake Ontario & St. Lawrence District.—In four localities in the Silurian and six in the Laurentian.

Eastern Townships.—In a number of localities in the Silurian.

Newfoundland.—In one locality in the Lower Silurian and one in the Carboniferous.

Maritime Provinces.—In four localities in the Primordial; seven in the Pre-Silurian; six in the Upper Silurian; one at the junction of the Upper Silurian and Carboniferous; one in the Lower Carboniferous; and two in the Devonian. The ores consist of magnetite, hematite, iron-stone, limonite, and specular ore. The amount mined in 1883 was about 97,000 tons, of which 44,635 tons were exported.

COPPER ORE.—Rocky Mountain District.—In seven localities in the Paleozoic, and one in the Tertiary.

Lake Superior District.—In one locality at the junction of the Laurentian and Huronian; in one locality at the junction of the Laurentian and Nipigon; in nine localities in the Huronian and copper-bearing series; and in one locality in the Nipigon series.

Lake Ontario & St. Lawrence District.—In one locality in the Silurian.

Eastern Townships.—In a number of localities, copper ore occurs in the Silurian.

Maritime Provinces.—In four localities in the Primordial or Lower Carboniferous; in ten localities in the Pre-Silurian; in one locality at the junction of the Primordial and Lower Carboniferous; and in four localities in the Lower Carboniferous.

Newfoundland.—In four localities in the Huronian; in two localities in the Silurian; and in one locality in the Devonian. The ores are native copper, copper pyrites, and bornite. Specimens from a mine opening at Silver City, near the Rocky Mountains, consist of malachite and copper glance. The total copper mined was about 4402 tons.

LEAD.—Rocky Mountain District.—In three localities in the Paleozoic.

Lake Superior District.—In several localities in the Nipigon and Huronian.

Lake Ontario & River St. Lawrence.—In four localities in the Silurian.

Maritime Provinces.—In one locality each in the Pre-Silurian, Lower Carboniferous, and at the junction of the Lower Carboniferous and the Pre-Silurian.

Newfoundland.—In one locality each in the Laurentian, the Huronian, and the Lower Silurian.

COAL AND LIGNITE.—Pacific Coast and Rocky Mountains.—In several localities, anthracite and bituminous coal are found in the Cretaceous.

Great Plain.—A number of localities where coal, chiefly lignites, is found in the Cretaceous.

Maritime Provinces.—A number of localities where bituminous coal is found in the Carboniferous.

MANGANESE.—Eastern Townships.—In two localities in the Silurian.

Maritime Provinces.—In six localities in the Lower Carboniferous. The total amount mined in 1883 was 1194 tons.

SILVER.—Rocky Mountain District.—In two localities in the Paleozoic.

Lake Superior District.—In one locality in the Huronian and in several localities in the Nipigon series. Total amount mined in 1883 was 100 tons.

MERCURY.—*Rocky Mountain District.*—In one locality each in the Paleozoic and in the Tertiary.

PLATINUM.—In two localities in alluvion in the Rocky Mountain District.

ANTIMONY.—*Eastern Townships.*—In two localities in the Silurian.

Maritime Provinces.—In one locality each in the Pre-Silurian and at the junction of the Upper Silurian and Carboniferous. Total antimony mined in 1883, 368 tons.

GOLD.—*Rocky Mountain District.*—In many localities in alluvion and quartz.

Lake Superior District.—In one locality each at the junction of the Laurentian and Huronian and at the junction of the Granite and Huronian.

Lake Ontario District.—In two localities in the Silurian.

Eastern Townships.—A number of localities in alluvion covering the Lower Silurian.

Maritime Provinces.—A number of localities in the Primordial and the Pre-Silurian. The total value of gold exported in 1883 was \$911,383.

SALT.—*Lake Ontario District.*—In three localities in the Onondaga.

Maritime Provinces.—In eight localities in the Lower Carboniferous. Total amount raised in 1883, 197,185 bushels.

APATITE.—*Lake Ontario & River St. Lawrence District.*—A number of localities in the Laurentian.

Maritime Provinces.—In two localities in the Lower Carboniferous. The total amount exported in 1883 was 14,478 tons. Very little was used in Canada.

PETROLEUM.—*Rocky Mountain District.*—In one locality in the Devonian.

Lake Superior District.—In one locality in the Tertiary.

Lake Ontario District.—In several localities in the Onondaga salt formation.

River St. Lawrence District.—In one locality in the Upper Silurian.

Maritime Provinces.—In three localities in the Lower Carboniferous. Alberta is found in five localities in the same formation.

GYPSUM.—*Lake Superior District.*—In one locality in the Devonian.

Lake Ontario District.—In two localities in the Onondaga formation.

Maritime Provinces.—In a number of localities in the Lower Carboniferous.

Newfoundland.—In two localities in the Lower Carboniferous. The total amount mined in 1883 was about 160,000 tons.

NICKEL.—*Eastern Townships.*—In one locality as millerite.

PLUMBAGO.—*St. Lawrence District.*—In several localities in the Laurentian.

ZINC.—*Lake Superior District.*—In three localities in the Nipigon series.

ASBESTOS.—*Eastern Townships.*—In three localities in the Silurian.

The above are most of the occurrences of the minerals in question, and in no way is it intended to convey the idea that their occurrence is limited to the localities mentioned. They might be considered as a few indications of an exceptionally large mineral development that we hopefully look forward to in the near future.

In the discussion following this paper, the president made a few remarks, in the course of which he said that the collection of statistics was of very great importance, and he thought it would be a good thing if the Canadian government would take the matter into serious consideration and find a way to the establishment of a bureau for the purpose.

Mr. Clement Le Neve Foster, of Wales, thoroughly agreed with the president, and said that the system in vogue in England for the collection of mineral statistics was the result of a meeting of this association, and he considered that the visit of the British Association to Canada would not be thrown away if the only outcome of it was the establishment of a system for the collection of statistics of the mining interests in Canada. He would suggest that a similar system to that in England might be adopted by the Canadian government. He stated that, at the last meeting of the inspectors of mines in England, a table of the mineral statistics of the British colonies was compiled for the Home Office, and great difficulty was experienced in collecting any statistics of the Canadian minerals. They had to resort to all kinds of resources, and the result was very unsatisfactory.

THE MANZANALL MINE DISTRICT, SONORA, MEXICO.

We abstract from a report of Mr. C. M. Rolker, mining engineer of this city, some general data that may be of interest to our readers.

The Manzanall Mining District is situated in the Manzanall range of mountains, which lies about 80 or 85 miles south of Tombstone, in the State of Sonora, in the Mexican Republic. The district is approached by a fair wagon-road, which, with comparatively little outlay of money, can be changed to a good road, excepting the last four miles, three of which run through a ravine filled heavily with sand and gravel. This part of the road can be laid along the ridges, giving an easy grade and a good road-bed. The last mile to a mile and a half to the camp will remain a road on which the supplies have to be transported on pack animals. It leads up a mountain probably 800 feet high. The elevation of the camp is about 4375 feet above the sea level, within 100 feet of that of Tombstone. Its contour is rather rugged. Water is scarce, and the timber within from four to six miles is poor and scraggy.

The district was formerly worked, but until a little over a year ago was made unsafe by Indian raids. Some of the old workings have been filled up—as the story goes, to prevent the Indians from taking out the rich ore that has been left. So far, no one seems to have had faith enough in these reports to clean out the old workings, and the camp will be judged from its present condition.

The veins of this camp form a triangular network. The El Capitan vein, which throws out the Echo and the Pollona as side veins, forms the northwest side, and the Providencia veins the base of the triangle. The latter runs nearly east and west. The veins that form the northeast side of the triangle have not yet been opened up. The sides of this triangular network of veins are from 6000 to 8000 feet long, and in their extent cut through ravines from 200 to 350 feet deep. They cut through the trachytic porphyry, and trachyte in places, strongly and boldly. The course of the veins is easily traced; they show the bold and high outcrop so frequent with Sonora veins. It is nothing unusual to find the outcrop projecting from 6 to 10 feet above the soil.

In the west corner of this triangle of veins, a companion vein (the San

Francisco vein) is traced, between the El Capitan and Providencia veins. For about 1000 feet, it runs midway between the two, but then turns back toward the Providencia vein, and unites with this about 3800 feet east of the westerly corner of the triangle. The Providencia vein consists of two nearly parallel veins, 20 feet apart. For 1000 feet longitudinal extent, it throws out a third vein, which, for the greater distance, appears like a third parallel vein, about 60 feet south of the other two. All three veins appear as one, 5100 feet east of the west corner of the vein triangle, after having previously also absorbed the San Francisco vein on its north side, which approaches on a curve.

The dip of the Providencia is to the north under about 80 degrees, while the San Francisco vein dips under from 45 to 65 degrees to the south. They will unite in depth. A section of the Providencia vein system may be represented by the skeleton of a hand, minus the thumb, with the index and little finger pushed a little apart, uniting in the wrist. In the veins, horses occur. This vein system is certainly a strong appearing one, and one apt to excite expectations; but so far, its intrinsic merit has not been established.

The veins appear variable in width, from 8 to 12 feet. The middle portion of the Providencia carries from 3 to 4 feet of brown hematite and yellow ochre on its foot-wall, in which bunches and patches of hard dark quartz and irregular seams and blotches of galena occur. Above that lie 5 feet of white quartz, followed by from 2 to 3 feet of quartz carrying specks of galena and sporadically also chloride of silver. The latter is shown in two cross-cuts run to the hanging-wall, beginning where the brown hematite ceases. The eastern portion of the Providencia carries carbonate of lead and copper-stained quartz; and the west end, carbonate of lead in brown hematite. The San Francisco vein is a quartz vein, carrying very little lead. The Capitan, Echo, and Pollona carry galena and carbonate of lead in quartzose gangue. The ore occurrence is not in solid masses or seams, but with a tendency to extreme irregularity in local spots; it occurs in nests, bunches, and blotches in a quartzose or a brown hematite matrix. The accumulation of ore from such material is necessarily slow, tedious, and expensive, since hand-picking has to be resorted to in this district. A high-grade ore is a necessity with such an ore occurrence. Were the brown hematite of a fair richness, and the occurrence of galena and carbonate of lead a heavier one, since lime can be quarried within about six miles from the mines, smelting could be resorted to; but neither the iron nor the lead ore is sufficiently rich to permit of it, and besides, so far the mines show the lead ore to occur in too small quantities. The quartzose ores are, in themselves, too poor to bear the expense of amalgamation in addition to mining, and they certainly do not occur in large enough masses to warrant the erecting of leaching and concentrating works for treating low-grade ores in quantities. Unless prospecting should show more merited developments in the future, this camp is one of the kind best left alone by the investor.

The galena as it would be mined from the hematite would average about 10 per cent in lead and \$25 in silver. The lead carbonate in the quartz occurs badly mixed, and would be difficult to assort. Fairly clean pickings averaged 20 per cent in lead and \$9.81 in silver. The carbonate, where it is found in the soft hematite or ochre, occurs in fine particles, and would require to be dressed out. Without dressing, assays return from 5 to 6 per cent of lead and from \$6 to \$7 in silver. (Part of the silver comes from the hematite.) All of these lead occurrences are irregular and limited. The hard brown hematite sampled repeatedly for itself, over stretches of 50 feet in length, returns \$7.50 in silver. The quartz of the Providencia, which carries blotches of galena, returned, where exposed underground (no amount of ground is standing in the mine), from \$13 to \$18 in silver and 2 per cent of lead. The quartz of the San Francisco vein averages about \$11.50 in silver. The Capitan, Echo, and Pollona galena and carbonate are somewhat higher, but not much.

QUANTITATIVE DETERMINATION OF VERY SMALL QUANTITIES OF SILVER.

By Carl Friedrich Fosh.

Proportions of silver that only form fractions of a thousandth per cent can be determined in the dry way. Besides the ordinary methods, which, when the proportion of silver is small, require much material and time, there is another dry process, the blow-pipe test, which leads rapidly and accurately to the object required, but demands great skill and experience. The author makes use of a combination of the two methods for the determination of minimum quantities of silver, which gives very good results without requiring more time than an ordinary assay. The resulting bead of silver is measured on a blow-pipe gauge.

Before describing the precautions and minutiae of this combination process, it may be well to give a short account of the process of measurement employed in the present method as well as in the blow-pipe assay.

As in the quantitative blow-pipe assay for silver only 0.1 gm. = 1 blow-pipe centimeter, is weighed out, the reguli, if the ore is poor, are too small to be weighed. Harkort first came upon the notion of measuring these globules and then calculating the percentage, since the weights of spheres of a metal are as the cubes of their diameter. To ascertain the latter, Harkort, and after him Plattner, made use of a narrow plate of ivory, upon which are drawn two converging lines with a maximum distance of 1 millimeter. These lines were about 15.5 centimeters in length to their point of intersection, and were divided by cross lines into 50 equal parts. In order to determine the values of this scale, Harkort proceeded empirically, since the reguli are not mathematical spheres. He determined the proportion of silver in an ore accurately, by a series of assays in the muffle, selected then the most faultless bead of silver, and moved it along between the converging lines of his scale till it touched them on both sides. At this point, the proportion was noted in percentages calculated in blow-pipe proof centners.

The other values were ascertained by calculation. If the necessary precautions are observed in reading off, there are obtained with the scale good results, which agree perfectly with those obtained by cupellation. It is possible with the aid of a lens in measuring to determine with ease a proportion of 0.005 per cent of silver.

Sometimes, however, in the examination of poor burnt pyrites, etc., a much higher degree of accuracy is required. This can, however, be

readily obtained by a combination of both methods. The bead obtained in the muffle from, for example, 10 grms. of raw material, is measured on the blow-pipe scale, and the percentage is calculated according to the quantity taken. But since, as already mentioned, with the aid of the lens a bead may be measured that in the blow-pipe assay (0.1 gm., taken) represents a percentage of 0.005 silver, it follows that by the combination method a percentage of $\frac{0.005}{100} = 0.00005$ (10 grms. being taken) can be quite as readily determined.

Indeed, accuracy can be carried as far as is desirable. If we, for instance, combine the crucible assay with the blow-pipe measurement, we may determine a percentage of $\frac{0.005}{1000} = 0.000005$, if 100 grms. have been taken.

Besides, the combination method is much more accurate than the blow-pipe assay, since an error committed during measuring is divided by 100 if we take 10 grms., and by 1000 if we take 100 grms.

As a degree of accuracy of 1-100,000 per cent is sufficient even for the most delicate purposes, for instance, in petrographic researches in the origin of metallic veins, this silver assay may be easily executed with the aid of a small muffle furnace, such as is generally to be found in laboratories for determining ashes, opening up ores, etc.

In order to determine proportions of silver of 0.0002 to 0.0007 per cent, the author proceeds as follows: Into a small crucible of fire-clay are put about 20 grms. of a mixture of equal parts flour and potash. Upon this is placed the substance in question, carefully weighed (10 grms.). The whole is thoroughly mixed and covered with about 30 grms. of proof-lead, free from silver. The whole charge is then covered with sodium chloride, and the crucible is placed in the muffle, which has been raised to a cherry-red heat, and left there for about three hours at a bright red heat until all the mass has been thoroughly liquefied.

Generally only two crucibles are used, assay and check-assay, placed in the muffle, and only if the silver is below 0.0002 per cent are four crucibles used, each with 10 grms. of the substance, the reguli being scorified together.

The lead reguli are generally too large to be at once driven off; they are generally scorified once and then transferred to the cupels.

In order to obtain a round, even bead, the operation is interrupted when the regulus is about of the size of a poppy-seed, and completed in a second cupel. As soon as the cupel begins to fume, it is drawn a little forward, and the aperture of the muffle is opened, to prevent the bead from spitting by cooling slowly. Even the smallest beads spit if cooled too quickly.

The second driving may be advantageously effected before the blow-pipe, as losses of silver are thus more readily avoided.

The bead of silver should be perfectly bright and white; it is carefully, and without great pressure, removed from the cupel by means of a forceps and a pointed knife, and cleansed by rubbing between blotting-paper.

While measuring, the eye, in order to avoid parallax, is kept as nearly as possible vertically above the bead, the latter lying on the same surface as it did in the cupel. The measurement is repeated at least three times, with intervals, turning the bead in the same plane. The arithmetical mean divided by 100, if 10 grms. have been taken, is the proportion of silver.

Of course, it is necessary before all things to ascertain whether the proof-bead used is absolutely free from silver. From 10 to 20 grms. are therefore examined according to the method above mentioned. Any silver found must then be deducted in subsequent operations.

Whether the combination method is applicable with the same accuracy to the determination of gold, must be decided experimentally.

The method is especially suitable for very poor silicates and requires only from four and a half to five hours for completion.—*Zeitschrift für Analyt. Chemie.*

SOME interesting figures with regard to the growth of the establishment belonging to Herr Krupp, at Essen, Germany, have just been published. In 1860, the Essen foundry had only 1764 workmen, but that number had risen to 7084 ten years later, and it is now upward of 20,000. Counting the women and children, Herr Krupp's establishment gives employment to 65,381 people, of whom 29,000 live in houses belonging to their employer. The foundry is divided into eight sections, and there are 11 blast-furnaces, 1542 other furnaces, 439 steam-boilers, 82 steam-hammers, and 450 steam-engines representing 185,000 horse-power. At Essen alone, to say nothing of the branch establishments, there are nearly 40 miles of rails, 28 locomotives, 883 trucks, 69 horses, 191 wagons, 40 miles of telegraph wires, 35 telegraph stations, and 55 Morse instruments.

THE BRITISH IRON TRADE.—The returns of the British Iron Trade Association show that the make of pig-iron in the United Kingdom for the half-year ended June 30th, amounted to 3,991,220 tons, against 4,138,225 tons in the same period of 1883, showing a decrease of 147,005 tons. Five districts only exhibit an increase—West Cumberland, Lancashire, Lincolnshire, Northamptonshire, and Notts. The chief falling off is in Cleveland and Scotland, which are accountable for 93,083 tons and 42,956 tons respectively, while Derbyshire figures for 37,902 tons. During the same period, the stocks of pig-iron have increased 10,429 tons, the amount at the end of the half-year being 1,425,343 tons. The total consumption for the half-year has been 3,980,791 tons, being at the rate of 7,961,582 tons per annum, or 487,786 tons per annum less than in 1883. The production of Bessemer steel ingots during the first half of 1884 was 637,843 tons, while in the whole of 1883 it was 1,553,380 tons. The steel rails amounted to 426,415 tons, against 1,097,174 tons during the previous twelve months. The returns of forge, foundry, hematite, and spiegel iron are not sufficiently complete to afford materials for a comparison with the last year's output.

FURNACE, MILL, AND FACTORY.

J. G. Haltman, of St. Louis, Mo., manufacturer of engines and mill machinery, has made an acquisition. His sets are \$75,000.

The Mahoning Valley Iron Company is running full-time in every department.

An exhibition of the Michaels coal-boiler was recently given at Pittsburg, Pa. The machine can unload 12,000 bushels of coal a day, the work of forty men.

The Brilliant mill, at Brilliant, Ohio, has been shut down on account of the clogging of the gas-well. There is also trouble reported between the mill-owners and the miners.

A decision of great interest to the hardware trade throughout the country was rendered September 18th by Judge Shipman in the United States Circuit Court at Hartford, Conn., in the case of the Steam-Gauge and Lantern Company against Edward Miller & Co. The suit involved the validity of the tubular lantern patent. It has been contested with great acrimony during the past three years, and has by all lantern manufacturers in the country been considered a test case. The court, in an elaborate opinion, sustains the validity of the complainant's patents, declares the defendant's lanterns infringements, and grants a peremptory injunction restraining the defendant from further violations of the complainant's rights, with damages for past infringements.

The De Laney Forge and Iron-Works, of Buffalo, N. Y., have shut down, owing to a lack of orders. One hundred men are thrown out of employment. It is believed the works will not resume before December.

An important conference of steel rail manufacturers of England, Germany, and Belgium has just been held at Bonn. It was decided to form an international combination of all the leading manufacturers for the purpose of maintaining prices and preventing overproduction.

Of the three blast-furnaces leased from the estate of W. H. Brown, at New Castle, Ohio, by Rhodes & Co., of Cleveland, one stack is in blast and two are idle.

The nail-works of the Hartman Steel Company at Pittsburg, Pa., are running full-handed. Orders are good, and they expect to go on double turn soon.

There are advices from Buffalo that the Union Iron-Works have been sold to the Lehigh Valley Railroad Company, and will hereafter be run at their full capacity.

The Beaver Falls, Pa., steel-works are running full-handed, but orders are light. The season so far is very backward. In previous years, at this time, these works were very busy.

The works of the Reading Tack Company, Reading, Pa., have finally been sold by the proprietors to Clement M. Biddle, of Philadelphia, who is largely interested in the tack business. The machinery has been shipped away from Reading. The works were in operation four months and were turning out 1000 pounds of tacks daily.

The nickel-works of Joseph Wharton, in Camden, N. J., resumed operations September 1st, giving work to about ninety hands.

The Chilean government intends to hold a permanent exhibition of American manufactures and machinery at Santiago. A circular has been issued, stating that the government will conveniently arrange a part of the National Exhibition Building at Santiago, in order that American manufacturers may exhibit their productions. All goods thus sent are admitted free of duties at the custom-house in Valparaiso, and become the property of the government from the time their invoices and bills of lading are delivered to the consul. The Chilean government pays the expenses for landing goods, and for their transportation as well as their care while there. No definite time or duration for the exhibition has been fixed. The Chilean government reserves the right of terminating it after two years' notice.

Machinery for making steel nails is to be put in the rolling-mill at Centralia, Ill., at an early date. The rolling and nail mills were both started up on the 8th inst.

Stewart & Co.'s old rolling-mill at South Easton, Pa., is now converting into a wire mill. The machinery, boilers, etc., recently purchased by the company in Brooklyn have been hauled to the mill, and will soon be placed in position.

The Glendower Iron-Works of Danville, Pa., were sold at sheriff's sale September 17th, for \$5000, subject to mortgages. Mrs. Hugh E. Steele was the purchaser.

The extensive vitriol-works of James Irwin & Co., at Pittsburg, Pa., were destroyed by fire September 17th. Total loss, about \$70,000.

A short time since, the West Shore Railroad Company sent out requisitions to the different engine-builders, to which it had a full response, and, in the face of much lower prices, it has just placed its order for a 300 horse-power Cummer engine. The engine is to supply motive-power to its large shops at Frankfort, New York. The Cummer Company feels quite elated at receiving this order, as it comes in the wake of an order received from the Pennsylvania Railroad Company under similar conditions, and under just as severe competition. The engine for the latter company has just been shipped, and will be used in its extensive new works at Indianapolis, Ind. The Cummer Company has also just been favored with orders for a 170 horse-power engine for the Hadley Cotton Mills, Holyoke, Mass.; a 130 horse-power engine, with outfit complete, for the Upton Manufacturing Company, of Battle Creek, Mich.; and two engines, 70 horse-power each, for the Citizens' Electric Light Company, Akron, Ohio. Cummer engines have just been started at the Louisville Exhibition, St. Louis Exhibition, and in the flooring-mills of Cheesman & Driesbach, Tonganoxie, Kan. The company reports work on the three large Ballantine refrigerating-machines for Joseph Hensler, of Newark, N. J., progressing very rapidly. Its orders are still on the increase, and a splendid outlook for future business.

The Vulcan furnace at Newberry, Mich., has gone into blast again. The run will probably enable the management to definitely decide on the practical value of the Mathieu retorts for charcoal making, and will be watched with special interest for that reason.

The Martel furnace, at St. Ignace, Mich., is again out of blast, having closed down after a four months' run.

A catalogue that in dimensions and in finish of printing and binding rivals the famous Centennial catalogues of the great local manufacturers, has been just published by Messrs. Manning, Maxwell & Moore, Nos. 111 and 113 Liberty street, in this city. As agents they fully illustrate and describe the manufactures of the following well-known manufacturers of railroad and machinists' tools and supplies: Niles Tool-Works, Pond Machine Tool Company, Brainard Milling Machine Company, Prentiss Brothers, American Tool Machine Company, F. E. Reed, Flather & Co., Long & Alstatter Company, James Brady, Valley Machine Company, Ashcroft Manufacturing Company, Consolidated Safety-Valve Company, Hancock Inspirator Company, Tabor Manufacturing Company, Midvale Steel Company, Keystone Portable Forge Company, Huntington Track Gauges, New York Locomotive Flue Welder, Colliery Furnace Cupola Company, Worcester Machine Screw Company, Morse Twist Drill Machine Company, Hub Friction Clutches, the Bigelow Company, Saunders' Corrugated Copper Packing and Gaskets, Morgan Engineering Company, Betts Machine Company, and the Page Belting Company. Besides the goods of these makers, there are all conceivable tools, machinery, and supplies, the whole making a volume of 660 pages.

RAILROAD NEWS.

The Philadelphia & Reading Railroad Company, for the first time in six months, began September 10th to meet its payment of wages on a regular or final payday, which is the 10th of every month. The amount of the pay-roll for the railroad and coal and iron companies is \$1,400,000. The scrip that was issued just prior to the property going into the hands of receivers for \$215,000 of over-due wages, has been taken up, and the company is about extinguishing the amount advanced by Drexel & Co. in July upon coupons. This amount was \$750,000 nearly all of which has been paid off, and the rest will be taken up before October 1st. The earnings of the property in August are estimated at \$2,100,000.

The Western North Carolina Railroad was completed September 12th to Charleston.

The Ohio Central Railroad Company's plan of reorganization has been adopted, and security holders will this week be asked to sign it. The company is now capitalized for \$10,570,000 bonds, and \$22,000,000 stock. Total, \$32,570,000.

It is stated that the Northern Pacific Railroad Company has put in effect a rate of fourteen dollars a ton on anthracite coal from Duluth, Minn., to Helena, Mont., in car-loads of ten tons or more. Coal can be purchased in Duluth at prices ranging from \$6 to \$7 per ton, according to size and quality, and with freight added it can be laid down at Helena at from \$20 to \$31 per ton.

Arrangements for the construction of a low-grade, broad-gauge, connecting line between Pittsburg and Lake Erie, are now in progress. The road is to be called the Ohio & Lake Erie Railroad. The line will be constructed on the bed of the old canal from Greenville to Erie, and it will be a direct connecting link over the Pittsburg & Shenango and Pittsburg & Western railroads from Pittsburg to Erie. The traffic will consist largely of coal and Lake Superior iron ores.

LABOR AND WAGES.

Belmont Lodge, of the Amalgamated Association of Iron and Steel Workers, composed of the boilers and helpers in the Belmont mill in Wheeling, West Va., September 13th, resolved to sever their connection with the association and solicit boilers all over the country to aid them in the disintegration of the amalgamation. This action is taken because of the refusal of the nailers who cut steel nails to demand a 20 per cent increase of wages, as the schedule signed last June by the manufacturers provides may be done.

The Miners' State Convention of Ohio has concluded its session. A resolution adopted September 11th reinstating the State Secretary, Williams, as a member, was rescinded, and President McBride and other officers who had tendered their resignations withdrew them and will continue in office. The resignation of Thomas J. Neal, Vice-President, was accepted, and William Steward was elected to fill the vacancy. David H. Davis, of Mineral Ridge, was chosen Treasurer in place of Joseph Healey, resigned. The president was authorized to file the papers of incorporation of the Association. The Committee on an Address to the Public was requested to indorse W. P. Rend's letter criticizing the railroad company and the operators in connection with the present strike in the Hocking Valley, and indorsing the position taken by the miners.

The miners in the employ of the Penn Gas-Coal Company, of Irwin, Pa., have formed a mutual aid society. The firm employs 1200 men.

At the Pittsburg Locomotive-Works, in Pittsburg, Pa., a number of men have been suspended every successive pay-day recently, until, according to one of the officials of the company, the force engaged is much smaller than that of a year ago. The opinion is expressed that an improvement will soon take place.

The strike at Hartman's Steel-Works, at Beaver Falls, Pa., is a failure. Thirty men returned to work September 15th, under promise to withdraw from the Amalgamated Association and the Knights of Labor, and others are expected to follow to-day.

According to a Pittsburg dispatch, Thomas M. Carnegie, of the Edgar Thomson Steel-Work, says: "The employes have not been notified that unless they accepted a reduction by November 1st the works will be shut down." He says: "It has not been decided just what is to be done; the trade is very much depressed, and there are now only orders enough on hand to run the works until November 1st."

Application was made by counsel of the Coal Miners' Association for the release of the sixty-five miners now in jail on charge of conspiracy, on the ground that the commitments were defective in every particular. Five were released on bail and the others were to have a hearing September 18th. Affairs at the miners' camp remain quiet.

Advices from Cleveland, Ohio, dated the 15th and 16th, state that the troubles in the Hocking Valley mining regions are not yet over. The miners held a meeting, September 14th, at Nelsonsville, with an attendance of 600 men. They decided to proceed to the Jumper mines, to stop the miners at that place, and try to induce them to join their ranks. The miners have adopted a system of sky-rocket signals and cow-bell taps, for giving direction to the movements. The Columbus, Hocking Valley & Toledo Company's hopper was approached last night by two intruders, and they received a welcome from one of the Findlay guards and two of Pinkerton's men. Two cases of shooting occurred at Murray City, September 14th. An appeal, signed by the most prominent citizens, was telegraphed to Governor Hoadly, for tents to shelter families ejected from their homes at Buchtel by the syndicate. At Shawneetown, the wages of the employes of the Fanny furnace have been reduced from fifteen to twenty-five cents a day. They continued to work on the promise of steady employment at the reduced prices. There is no change in the great strike here. Three companies of troops are still held in the Hocking Valley, but it has been quiet ever since their arrival, with the exception of personal encounters, and some trouble in ejecting strikers from the houses of the operators.

The Cambria Iron Company, of Johnstown, Pa., employing 5000 workmen, posted a notice, September 16th, ordering a general reduction of wages from 10 to 20 per cent, to go into effect October 1st. This action the company claims to be imperative, owing to competition and the great and continued decline in the value of its products. In order to equalize matters, a reduction of 10 per cent will be made in coal and in the rents of the dwellings owned by the company. The reduction will probably be accepted.

A committee recently sent to Denver by the miners of Coal Creek, in Fremont County, to solicit donations to aid the miners, received \$555.

COAL TRADE NOTES.

CALIFORNIA.

The seam of coal reached in the Wellington mine, at Nanaimo, has proved to be thirteen feet thick. The quality is said to be excellent.

CANADA.

PROVINCE OF NOVA SCOTIA.

The Cumberland Coal and Railroad Company has since the first of the year turned out 163,000 tons of coal. The company supplies the Richelieu-Ontario Navigation Company with all the coal required to run its numerous steamers, and the Grand Trunk Railroad has received 60,000 tons so far this year. At the mines, a new slope has been sunk, called the south slope, and has now reached a depth of 640 feet. From this shaft, levels are running out, and as the dip is only 14 degrees as compared with from 30 to 40 degrees for other seams, this section of the coal-field can be worked much more cheaply than others. The new slope is equipped with the best and latest coal-cutting machines driven by compressed air. The coal can thus be produced rapidly and in excellent condition, making less slack and more round material. John McDougald, Montreal, is building a pair of large air-compressors, 18 inches diameter and 3-foot stroke, driven by a pair of steam-engines of the same size, which will be employed in running the coal-cutting machines; the latter are of the latest and most improved description. This new machinery will be in place by the first of November. The thickness of the seam is 12 feet, and it promises exceedingly well. It is expected by the beginning of next year, with this new slope and the improved machinery purchased, to have facilities for turning out 3000 tons a day. The average daily production this

year has been about 1500 tons a day. About 800 men are employed. Spring Hill is now the most important town in Cumberland County, and is growing rapidly, the population being in the vicinity of 3500. New houses have been put up for the workmen, and many of them have little cottages that give no little evidence of taste and refinement. The company gives the land to them at a merely nominal rent, in order to encourage the men to build their own houses. One hundred tons of coal a day are now shipped to the Steel Company of Canada, at Londonderry, from which it manufactures good coke. The company contemplates putting up coking-ovens at Spring Hill soon, that will enable it to supply the Steel Company with 1000 tons a week. A through rail line to the States will open up a market for all the coal the company can produce next year, both across the lines, and along the New Brunswick Railroad as well. Cars can then load at the mines and the coal be transferred to any point on the continent without breaking bulk. Additional property has recently been purchased at Spring Hill, and now the company owns 23 square miles of mining rights. New wharves are building at Farrisboro', where vessels of 1500 or 2000 tons can load.

Work continues fair at the mines in Pictou County. The Vale is doing a better business than for some years back. The Acadia and Drummond are working steadily, and there is little idle time at the collieries of the Halifax Company. It is expected that the output of the Halifax, Acadia, and Vale companies will be considerably in excess of last year, while the output of the Drummond will show a slight falling off.

The Nova Scotia Coal Company's railroad bridge at Bear Brook, Pictou, caught fire September 14th from a locomotive, and over 100 feet of it were burned. The bridge was about four hundred feet long and ninety in height. Its destruction is a serious loss to the place, the greater part of the Acadia Company's coal being shipped over this railroad, and no more can be shipped this way during the remainder of the season.

MARYLAND.

One of the features of the Maryland exhibit at the New Orleans Exhibition will be the specimens of Cumberland semi-bituminous coal. Fac-similes of the coat-of-arms of Maryland and of the Battle Monument are to be constructed out of State productions, with Cumberland coal as the base of the monument.

NEW YORK.

An assignment was filed in New York September 13th by the firm of Joseph K. Wells & Co., coal dealers, with about \$55,000 preferences. The company had a capital of \$75,000, and was thought to be doing a business of \$1,500,000 a year. The liabilities, it is believed, will reach \$200,000.

OHIO.

Ground has been broken for a new shaft for the Sippo Coal Company, near Massillon. It will be 110 feet deep, and open thirty acres of coal land.

The new shaft at the mines of the Manning Coal Company has been completed and work resumed. The company has plenty of orders on its books.

PENNSYLVANIA.

ANTHRACITE.

Four boilers at the Lykens Valley colliery, at Lykens, exploded September 16th. Four persons were injured, one of them mortally. About \$10,000 damage was done by the explosion, and it will cause a suspension of work for several days. The colliery is owned by the Pennsylvania Railroad Company.

The air-shaft of the Woodward colliery of the Delaware, Lackawanna & Western Coal Company has reached the Ross vein at a depth of about eight hundred feet.

The double track in the slope at Morris Ridge colliery is completed and hoisting begun. The shipments of coal will be greatly increased by this arrangement.

The output of the East Boston will be very much increased by the substitution of new direct-acting engines for the old pair of engines, and the sinking of the shaft to the lower veins.

Contractor Joseph C. Tyrrell expects to turn over the breaker he is constructing at Plymouth to the Farrish Coal Company about September 20th. The new breaker is fine in all of its appointments and well constructed.

Breaker No. 1, of the Lehigh Valley Coal Company, at Colorado station, will be abandoned in a few months, owing to the fire raging in a culm-pile adjacent to the structure. The fire has been beyond control for several years.

A slope on the Baltimore vein at the colliery No. 6, of the Lehigh & Wilkes-Barre Coal Company, at Ashley, has just been completed. It runs on the Baltimore vein from the outcrops to the basin, and was originally 950 feet in length, but its recent extension has lengthened it out to a distance of 2450 feet. This slope opens up a large deposit of anthracite.

The Primrose vein was struck at Hammond colliery September 8th, but has not yet been tested fully.

The Lehigh Valley Coal Company is driving a new gangway at Continental colliery. Several breasts have recently been opened on it. The coal is of a superior quality.

There has been extensive caving-in of the earth recently in the vicinity of Dark Corner, and a number of houses are in danger of destruction. The surface over the North Ashland mine is cracked for a quarter of a mile, and work in the mine has been suspended.

COKE.

According to dispatches from Pittsburg, the Connellsville Coke-Producers' Association is meeting with some new opposition from the pig-iron men of the East. They claim that the combination of the pig-iron trade will not admit their paying the pool price for coke, and that, unless the price is reduced, they will have to bank their furnaces. Some of them have already notified the coke men to ship no more fuel at present prices, as they have concluded to close their furnaces until such time as they can operate them with profit. Other Eastern pig-iron men are endeavoring in every way possible to induce some of the Connellsville coke men who are not members of the association to furnish them coke at a reduced price. So far, no lower price has been reported, and the efforts of the Eastern pig-iron men to get their coke for less than the pool price has been a failure. The action of the pig-iron men in moving for a shut-down of several weeks, in order that the production may be cut down, has caused some uneasiness among the coke producers.

NATURAL GAS.

A company is forming at Sharpville for the purpose of drilling for gas. It is believed it will be found in paying quantities in that locality.

A company has been formed at Waynesburg that has the exclusive right for twenty years' use of natural or manufactured gas for heating and illuminating purposes.

Natural gas is used with success in the melting-furnace of Phillips & Co.'s window-glass factory, at Pittsburg.

The organization of the Springdale Gas Company, Limited, has been effected. The capital stock is \$4000. Drilling will be commenced in a short time.

The Citizens' Natural Gas Company, of Washington, has contracted with W. C. Marr to sink a well for \$3 a foot. Bids at from \$1.70 to \$3.15 were made.

An innovation is testing at the Fishbach rolling-mill. A small gas-making machine was recently put up, and has been connected by a long pipe with one of the heating-furnaces. A trial was made last week of heating iron by gas instead of coal, and it worked satisfactorily. The test is continued this week, and, if the same success is found, it may be adopted for the mill generally. While the gas costs more than the coal required to maintain the same degree of heat, there is a great saving in other ways that compensates for it.

The petition of George Westinghouse, Jr., H. H. Westinghouse, John Pitcairn, John Caldwell, and John Dalzell, asking to be joined with Robert E. Pattison, Governor of Pennsylvania, in the suit recently brought against him by the Fuel-Gas Company of Alleghany County, which company seeks to enjoin him from issuing charters to the Heat, Light, and Power Distributing Company, the Gas and Fluid Transportation Company, the Alleghany County Gas and Fluid Transportation Company, the Alleghany Heat, Light, and Power Company, the Sterrett Heat, Light, and Power Company, the Wilkins Heat, Light, and Power Company, the Braddock Heat, Light, and Power Company, the People's Gas Storage and Transportation Company, and the Alleghany County Pipe Line Company, has been presented to the court. It is stated that the above-named parties desire to take part in the case because their rights are involved, as they are the applicants for eight of the charters. They desire prompt action, as they have a well from which natural gas is escaping to the value of \$1200 per day, which could not be properly utilized until their charters were obtained. Lyman D. Gilbert, attorney for the Fuel-Gas Company, denied the right of the petitioners to take part in the proceedings, and the court fixed the 19th inst. for argument upon that point. Deputy Attorney-General Snodgrass said that he had not had an opportunity of consulting with the governor, attorney-general, and secretary of the commonwealth, and therefore could not at present state the views of the governor upon the application of the parties to be joined with him in the suit.

VIRGINIA.

The coal mines at Midlothian, Chesterfield County, have been placed in the hands of a receiver.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

The new hoisting-works are ready for shipment. They will be erected in the Copper Czar claim, east of the Queen. The shaft will be 500 feet in depth and perpendicular.

TOMBSTONE DISTRICT.

GRAND CENTRAL.—The company paid the miners September 5th.
PROMPTER.—Mr. J. V. Vickers has been appointed receiver for the property.
SYDNEY.—It is reported that this mine, situated near the Grand Central, will be worked soon.

TOMBSTONE MILL AND MINING COMPANY.—According to the *Tombstone Record*, papers have been filed in the suit of J. D. Rouse vs. Tombstone Mill and Mining Company. The action is brought to recover \$110,000 damages, and permission from the court to visit with engineers the underground workings of the Good Enough mine. The plaintiff states that he is the owner of the Gilded Age mining claim, having purchased the same from Messrs. Field & Sanford, its former owners. That while the claim was owned by Field *et al.*, the Tombstone Mill and Mining Company extracted from it, by means of workings from the Good Enough claim, ores to the value of \$35,000, and since the claim came into the plaintiff's possession, ores to the amount of seven hundred tons, valued at \$100 per ton, have been taken from it.

It is understood that Mr. W. J. Cheyney, managing director of this company, will be in Tombstone before many days, when work on the company's property will be resumed. It is not probable a superintendent will be appointed to fill the vacancy occasioned by the resignation of Professor Church, it being more than likely that Mr. Cheyney will remain and take charge himself.

MOHAVE COUNTY.

The mill at Cerbat started up again on tailings from Charles Gross's old arrastras. The tailings, of which there are in the neighborhood of 250 tons, are run through both the battery and roaster, at the rate of ten or twelve tons per day, their average value being from \$16 to \$24, of which the company saves nearly all.

PIMA COUNTY.

CARTHAGE MINING COMPANY.—The company organized to operate the Gun-sight mine will be known by the above name.

ARKANSAS.

The existence of manganese ores of fine quality in Arkansas has long been known, but efforts to develop them have not until recently been undertaken on a very extensive scale. Before the war, a mine was opened in Independence County, and worked to some extent, the product being shipped to New York. The venture did not pay, however, and the undertaking was abandoned. At the present time, there are several companies engaged in taking out this ore, or making active preparations to do so. Some of them are doing well, and all feel confident of success. The mines are all in the vicinity of Batesville, the county-seat of Independence County. The Ferro-Manganese Company's mines, about twelve miles from Batesville, has shipped some fifty car-loads of ore. It employs eight or ten teams and some twenty men. The Arkansas Manganese Mining Company, composed principally of Hon. W. C. Whitthorne, ex-Governor John C. Brown, and Mr. Jerome Hill, all of Tennessee, has made some shipments of ore to St. Louis, and is preparing for operations on an extensive scale. A corporation known as the White River Mining Company is composed of Cincinnati and Kentucky parties, represented by A. M. Evans, an expert in mining matters. This company proposes to operate heavily at an early day. The White River Mining and Transportation Company controls a very large body of manganese lands, and has been operating some time with satisfactory results. This company is composed of R. R. Case, of Batesville, and L. S. Lapham and William Einstein, of St. Louis. Mr. Case owns some 20,000 acres of mineral lands, much of it containing manganese, gold in paying quantities, and lead of rare purity. Besides the companies named, the firm of Hutton & Gibb, of Batesville, is making preparations for active work.

CALIFORNIA.

INYO COUNTY.

ELNA.—An important addition has been made to the works at the Elna furnace by the erection of a refinery, now almost completed. Hitherto, the bullion was all shipped to San Francisco, thus adding largely to the expense for freight, and taking away lead that was needed to mix with ore in the furnace. Now the lead will be extracted at home, and will help largely to increase the amount of ore that may be worked. The full capacity of the furnace is thirty tons a day, and it will be soon working that quantity. The company can easily supply the furnace fully from its own mine.

GREENLY.—Additional machinery and appliances have been purchased for saving the gold at the Greenly mill, Deep Spring District. The mill has been running since June last.

MCMURRAY.—Some work is doing toward completing this furnace.

MONO COUNTY.

MAY LUNDY.—The company's indebtedness has not yet been settled, and nothing definite has been learned as to what will be done toward arranging the affairs.

BODIE DISTRICT.

Reports for the week ended September 8th:
BODIE CONSOLIDATED.—There were 189 tons of tailings worked at the mill during the past week, the average assay value being \$6 a ton. There is no

change to note in the mine, and every thing is working well. Thirty-six men are employed.

BODIE TUNNEL.—Work on this mine has been suspended for the present.

STANDARD CONSOLIDATED.—There were extracted and shipped to the mill 528 tons of ore and 590 tons of tailings. Received from the ore 590 ounces of crude bullion, and from the tailings 362 ounces. Every thing around the mine and mill is running well.

FLUMAS COUNTY—GREENVILLE DISTRICT.

CRESCENT.—Mr. George P. Cornell has been appointed superintendent. As soon as the legal difficulties pending are settled satisfactorily, work will be commenced at the mines.

FOREST KING.—The Arcadian mill has ceased to run on ore from this mine, the lease of the mill having expired. The owners will now further develop the mine.

GREEN MOUNTAIN.—Work progresses satisfactorily.

SAN BERNARDINO COUNTY.

BONANZA KING.—During the past three months, the greater portion of the working force has been employed on dead-work. The work to the northwest has developed no very large bodies, but has resulted in furnishing a constant supply of ore, and it is expected to uncover more extensive deposits in this section of the mine. The mill is running finely with most favorable results.

TRINITY COUNTY.

CONSOLIDATED EXCELSIOR MINING COMPANY.—The company has filed articles of incorporation to carry on a milling, mining, and merchandise business in this county. Its capital stock is \$5,000,000, divided into 100,000 shares.

CANADA.

PROVINCE OF NOVA SCOTIA.

There is a probability, says the *Stellarton Trades Journal*, that use will soon be made of the large deposits of iron ore on the Grant property, East River. A representative of the Steel Company of Canada has been negotiating with the proprietor for a sale of the mineral. The company offered a royalty of 10 cents a ton, and agreed to mine 30,000 tons a year, or pay an equivalent. This, it is understood, was at first refused. The chances are, however, that a bargain will soon be struck.

COLORADO.

BOULDER COUNTY.

A Denver party is building a concentrating mill at Boulder. The Rouse tables will be used. The party has control of several mines near the narrow-gauge railroad, and intends shipping ore from them.

BLACK CLOUD.—This mine, which has been a complete failure under its former management, has been leased and bonded by an Eastern company. A ten-stamp concentrating mill is run in connection with it. Mr. Walter H. Wangelin is superintendent, and as he has received his education as mining engineer under Professor Potter, of the Washington University, St. Louis, success can almost be guaranteed.

GENGHIS KHAN.—This mine, containing free gold, will start up again next week.

POORMAN.—Work goes on steadily, and very rich tellurium ore is produced.

SLIDE.—Under the management of Mr. Von Veidt, this mine is producing a large amount of ore. A mill on Left Hand Cañon has been leased to concentrate the ore.

WILD TIGER.—A body of very rich, first-class ore has been struck, running above \$22,000 a ton.

YELLOW PINE.—Twenty-five men are working at the mine, which is paying handsomely. As no stoping is done, it may be considered the best mine in the county if not in the State. An Eastern company intends to take hold of it.

CHAFFEE COUNTY.

During the month of August, P. A. Kalbough shipped from his Garfield lime quarry 270 cars of lime rock to Leadville smelters. J. W. Cummins bought a half-interest in this quarry last week. Quite a large number of men are employed, and the owners expect to ship fifteen car-loads of rock a day during the present month.

A force of men has begun sampling ores and fluxes at the St. Elmo smelter, and is now bedding the materials preparatory to blowing in.

CLEAR CREEK COUNTY.

Fifty car-loads of ore were shipped from Georgetown during August, 24 of which went to Denver, 22 to Argo, 2 to Golden, and 2 to Black Hawk. There were nearly 600 tons, valued at about \$75,000.

Three hundred and twenty-three tons of ore were shipped from the Silver Plume depot, valued at about \$45,000.

COLORADO CENTRAL.—A streak of several feet of solid galena ore that will run little short of 100 ounces silver a ton, with a fair per cent in lead, has recently been struck.

JOHNSON.—Operations have been resumed on this mine, formerly known as the Belmont, the oldest mine in the county. The owners have let leases on all four levels, and regular shipments of ore are made.

KOHINOOR-DONALDSON.—It is stated that the company has authorized the loan of \$50,000. It is hoped that work will be resumed soon.

CUSTER COUNTY.

BUFFALO-BOULDER.—The mill is said to have reverted to the original owners.

DOLORES COUNTY.

Mr. Linwood O. Towne has sent the following notes:

C. H. C.—The vein has rapidly increased from a width of twelve inches to four feet. The force of men has been doubled. The ore is high-grade silver with galena, sulphate, and carbonate of lead. Daily shipments are made to the Pasadena Company. A wagon-road to the mine has been making the past week, and preparations made for at once putting up at the mine ample ore-sheds, a boarding-house, etc. The improvement in the C. H. C. is causing the pushing of work on many properties in its vicinity on Telescope Mountain.

LITTLE MAGGIE.—A force of from 20 to 30 men is constantly employed in taking out ore for shipment to the Pasadena smelter. A wagon-road was built in the spring to the Black Hawk mine, which lies just below the Maggie. The Leila Davis and Maggie have ore-sheds on this road, the ore being hauled to them on wooden sleds. The steep grade to these mines makes the continuation of the road impracticable, but suits well the conveying of ore in the above manner. There has been some talk of a tramway.

PASADENA SMELTER.—The heating up of the new furnace has been going on the past week, and all preparations have been made for blowing in on Saturday, the 13th inst. The low smelting rates are causing the working of many mining properties hitherto undeveloped. A number of mining men from Mount Wilson, Ames, Ophir, etc., are in town making arrangements for treatment. The Silver Bell, of Ophir, is now shipping here.

SANTA CLARA.—This company has leased its mill for two years to a company of which Mr. E. P. Suydam is at the head. The mill will be run by Captain John McCassey, who has just finished putting in machinery for the Rico Reduction Company. Wet stamping will take the place of dry as formerly, and other changes will be made in the amalgamation plant. The leasers of the mill have also secured one on the Puzzle Extension mine for a like time. Work on it has already begun, and a large body of high-grade ore is said to be in sight.

FREMONT COUNTY.

ROCKY MOUNTAIN MINE DEVELOPING COMPANY.—The contractors began raising ore from the 150 level of the Green Mountain mine on the 6th inst., from which point levels will be extended both ways on the ore-body to make room for stopers. It is the intention of the company to produce about 30 tons a day, and to desulphurize it by open-air roasting at the mine.

LAKE COUNTY.

The Leadville *Herald* reports the following:

The shipments of ore from Leadville to smelters elsewhere are on the decrease, owing to the competition here, and the inducements that Leadville smelters are offering for Leadville ores. As the output of this district at present is larger than it has been for nine months past, our smelters must be accumulating a surplus stock of ore.

ARGENT.—The *Herald* gives further information about the property, the sale of which we reported in the last number of the *ENGINEERING AND MINING JOURNAL*: The properties sold embrace the Vining mine, on Rock Hill, and the Frank Shipman claim adjoining; also the Baltimore and Chieftain claims, on Yankee Hill. The trust deed under which the property was sold was given to secure a bonded indebtedness created in the spring of 1881, at which time the company borrowed \$25,000 for the development of its property. The bulk of this money was expended on the Vining and Frank Shipman claims, on which a shaft 350 feet in depth was sunk, disclosing a strong vein, with, however, very little pay ore. Mr. Loomis, the manager of the property, worked hard to make it pay. At one time, it gave promise of developing good ore-bodies and becoming a profitable mine. The ore was pockety, and, despite the untiring efforts of the manager, the Vining could not be made to pay. The developments of the mine are extensive, embracing thousands of feet of exploration-work, thoroughly prospecting a very large area of ground. The production of ore during the past few years has been fair, and had it not been for its occurrence in sporadic pockets, and the necessity of so much questionable prospect-work, the mine might have paid out and yielded some profits.

CHRYSOLITE.—The Kearney mill, under the management of Mr. Clark, of the Chrysolite mine, was started up September 8th, and is now running very successfully on low-grade milling ore from the mine.

EVENING STAR.—The eastern portion of the mine has been leased to Messrs. Evans and Clark. The company retains control of the shaft, from which it expects to do considerable prospect-work hereafter, and will hoist the ore for the lessees.

FLORENCE.—The output of this property during September will approximate 1500 tons. The ore, according to recent settlements, will run half an ounce in gold and over, and ten ounces in silver to the ton. The ore also contains from 25 to 35 per cent in lead, making the net value above smelting charges from \$25 to \$30 a ton.

IRON SILVER.—The gross ore production of this company's property during August amounted to about 4000 tons, of which 800 tons were the product of the company's work, and 3200 tons were extracted by lessees who are working the greater portion of the old workings of the mine on royalties. The principal work of the company is the development of the H. D. claim, which is carried on from the No. 6 and other shafts on the Stone, in California Gulch. The drift opening up the H. D. has now advanced about 800 feet southeast of the Stone No. 6 shaft. Exploration-work continues from the Moyer shaft. The exploration of the contact and ore-body opened by the Moyer shaft is continued by a series of levels, driven on the plane of the contact. So far, this work has disclosed an immense body of sulphide ore, but pockets of paying mineral are limited.

LA PLATA.—The reduction-works of the company are running at full capacity. The mine owned by the company, situated in California Gulch, is disclosing new resources and extends excellent promises for the future. During August, about sixty men were employed in the property, and an output secured of 1300 tons of smelting ore, all containing a large amount of lead and a fair value in silver. With the late rich discoveries in the Crown Point and Pinnacle mines, immediately adjoining the La Plata property, the possibilities and value of the latter have greatly increased.

PARK COUNTY.

BOAZ.—The annual meeting was recently held at Leadville. The first of October the general office of the company will be removed to Boston. The five properties included in the company—the Charles XII., Centennial, Mountain Star, Stella, and Louisiana—are all in good mineral. The Charles XII., in particular shows large bodies of good mineral in all four of its tunnels. In the lower tunnel, sinking in the granite has developed 10 inches of \$200 mineral. Several lease companies are working on this company's property. The company proposes to start another tunnel at Louisiana, about 250 feet below the present workings. This tunnel will prove up the property, and, being on a level with the old Orphan Boy, will cut the same body of mineral taken from that mine a few years since.

LONDON.—The mill is still running on tailings. There is also a rumor that the mine will not be shut down for long.

NESTOR.—The stamps at the mill are proving the true value of the company's mine as a gold producer. Two fine retorts have already been sold, and this week a night shift has been added to that part of the mill, so that it can run continuously. In a short time, the concentrators will be run at night as well.

ST. LOUIS.—An ore-strike has been made on this lode, up North Mosquito. The ore is of good quality, but the extent of the body is unknown.

PITKIN COUNTY.

The Aspen smelter has resumed operations, having fully repaired its furnaces and provided ample fuel and fluxing material.

The erection of a ten-stamp mill has been commenced at Graybill's camp, on Four Mile Creek.

The Wilson, McMurchy & Martin concentrator has been started up, and is reported to be doing very good work.

SAN JUAN COUNTY.

Theodore B. Comstock has sent us the following notes:

Shipments from Silverton amount to from 200 to 400 tons a week.

CENTENNIAL.—The mine is yielding good ore, carrying bismuth.

DETROIT & EUREKA.—The tunnel is rapidly pushing to strike the Centennial and Roving Ranger vein. The Niagara Company's properties are, in part, on the same vein, across the Animas River.

FRANK HOUGH.—Ore from this mine is coming to Silverton.

MC MILLAN.—Shipments are about to begin. The ore is a heavy galena.

MINNEHAHA.—The mine is worked in an admirable manner by George Kislignbury, an experienced and thoroughly capable miner. Three levels and a connecting winze are running. The property is owned by Cleveland men, who are putting up money enough to make the items of general expense light in proportion to the total outlay—a plan which is commendable and which might be adopted by other companies with great benefit.

MYSTERY.—Fair ore is shipped, a large force of men is employed, and money is spent very freely in improvements. It would be better policy in the end to proceed more cautiously, as the vein has not yet been thoroughly proved, and its development will soon receive more careful engineering.

NIAGARA CONSOLIDATED.—This company, at Eureka, is working the Cuba vein. The manager's monthly report to stockholders will be sent out next week.

ROVING RANGER.—The mine is worked by a force of men with favorable results.

SAMSON.—The sampling-works at the mine started work on the free gold ore this week. The stamp-mill is progressing, and the Huson tramway is again in operation. Mr. Stahl has resigned the management.

SUMMIT COUNTY.

GREER.—This concentrating mill, at Kokomo, was sold at trustees' sale lately and purchased by Mr. William Gleason.

DAKOTA.

ALTA.—It is expected that the Alta mill will be placed in position on Castle Creek and ready for running inside of ninety days.

CEDAR RAPIDS.—The shaft has been sunk to a depth of 135 feet, and drifting has been commenced in order to reach and cross cut the lead.

FATHER DE SMET.—The superintendent writes, under date of September 4th, as follows: Inclosed please find express company's receipt for bar No. 191, containing 1379.30 ounces of gold, the result of clean-up of mill for final run in August, making a total of 2551.35 ounces for the month's product. The general outlook at the mine is practically unchanged, with the exception of ore-breasts around the Eureka open cut, which shows more slate coming in than heretofore, but not enough to affect the general results to any great extent. Uprise, third level, is up 25 feet, with face in milling ore, which no doubt will continue all the way up to the second level. East cross-cut, second level, is out 10 feet—face in slaty material of no value.

IDAHO.

BALTIMORE & VICTORIA.—The first shipment for the year of ore from this group of mines has just been received at Hailey. It was a lot of 11½ tons, which carried 66½ per cent lead and 132 ounces of silver a ton. It netted \$1154.31.

HOLYOKE.—Mr. Christie, the president, and several large stockholders of the company, have started for the mines to inspect their condition and to put the property in good working order. They will return in about three weeks.

MEXICO.

The Mexican *Financier* has the following notes: Sr. Joaquin Ramos, mining engineer and chief of the scientific commission appointed by the Minister of Public Works to report on the gold region of Calmahi, states among other items of information furnished to the branch commission of the New Orleans Exhibition in La Paz, Lower California, that the section that he has been exploring is crossed by various systems of gold quartz veins, mingled with copper, of which some have averaged \$70, \$150, \$180, and \$240 a ton. Hitherto, no systematic operation of this field has been carried on, and the greatest number of men employed has been 180; but with the introduction of improved machinery, easier communication, and better facilities for existence, it would become a much more profitable field. In that case, a mining center would spring up, about 80 kilometers distant from the Pacific coast.

STATE OF SONORA.

YAQUI GOLD AND SILVER MINING COMPANY.—The property is situated near the village of Cajon. It is reached via Tucson or Benson. From Benson via Altar, is about 40 miles; from Benson via Santa Ana, part rail, it is 303 miles. The company owns the Yaqui and Amarillas claims, and, 2½ miles westerly from these, a ten stamp mill and mill-site, which is in the village of Cajon. The Yaqui ledge is not worked, since the ores did not prove sufficiently rich to bear the expense of working. The Amarillas ledge can be traced for 3600 feet, the last 2700 feet having a strike of magnetic north and south, with a dip from 80 to 80 degrees to the west. The ledge averages 3 feet in width. It cuts directly through slate formation, and has a heavy gangue of semi-vitreous quartz, carrying free gold, pyrite, arsenic pyrite, and some galena. Above water-level, oxidation of the sulphides has taken place. The ore is easily mined, and assays vary from \$7.50 to \$55.50 in gold a ton. At some remote data, this vein was vigorously worked, and all the ore taken down to the water-level. The bottom of the old works has been definitely located by the present company, and it has extracted ore from the ground between the old works and the lower level. A mill-run on 150 tons of ore, of which two thirds was low grade, brought \$15.68 an ounce in San Francisco. A great percentage of the gold in the ore is very fine. The Yaqui mill, which is a plain gold mill, saves about 50 per cent of the gold in the ore. The mill and mine are connected by a wagon-road of easy grade. Water is obtained from wells in the cañon and from the mine, but as a general thing the supply is limited. Wood is scarce in the immediate vicinity of the mine, but an abundance of first-class mesquite wood can be obtained about seven miles north of the mine, on the Altar road. It will cost, delivered at the mine, from \$2.50 to \$4 a cord—\$1 for cutting, and from \$1.50 to \$3 for hauling, according to distances. Nearly all the timber used in the stopes comes from the wood-pile. Mesquite is used throughout the mine for timbering where the length required is five feet or less, it being almost impossible to get it straight for a greater length. Sticks, for tunnel sets, seven feet long, are delivered at the mine for 12½ cents a running foot, but they can not be obtained in quantities. Labor ranges from \$1 to \$2 a day. It is not, however, skilled mining labor.

MICHIGAN.

COPPER MINES.

ALLOUEZ.—The new or third Ball's head in the Allouez stamp-mill is now in operation.

PENINSULA.—The present owners of the mine, if they can not advantageously lease or dispose of the property, will continue to work it. Arrangements have been made to pay all debts owed by the corporation.

WOLVERINE.—The company has just given the contract to McCurdy, Key & Emery for the erection of a large addition to the Wolverine mill, which will contain the No. 2 Ball's head. It is stated that the company intends purchasing a stamping outfit from the Calumet & Hecla Mining Company, which is placing Leavitt's heads in place of Ball's.

GOLD MINES.

NORTHERN BELLE GOLD AND SILVER MINING COMPANY.—The organization of this company has been effected, with W. H. Goodrich as President; H. D. Weed, Vice-President; E. R. Green, Treasurer; and J. F. Chynoworth, Secretary. The company will develop a gold and silver property in the Agogebic region.

MISSOURI.

BALANOS MILL AND MINING COMPANY.—This company, at East St. Louis, has been organized for the purpose of mining and smelting ores, metal, etc.; capital stock, \$20,000,000; incorporators, James W. Provard, Andrew B. Morrison, and Thomas C. Fletcher.

GRANBY MINING AND SMELTING COMPANY.—The works of this company, at Oronogo, were burned September 14th, with \$40,000 worth of new machinery.

MONTANA.

LEWIS & CLARKE COUNTY.

TEN MILE CONCENTRATING WORKS.—Arrangements for the erection of the mill, the delivery of lumber, machinery, and all necessary supplies have been made. The buildings are under contract to be completed within thirty days, and the machinery will be placed in position as rapidly as possible.

MEAGHER COUNTY.

MOUNTAIN CHIEF.—The Boston Hudson Mining Company has purchased this mine for \$18,000. The company will proceed at once to erect a mill capable of

developing the full capacity of the mine. Mr. Ballou, the business manager, has gone East to ship the necessary machinery as soon as possible.

SILVER BOW COUNTY.

ANACONDA.—The first fires in the furnaces were started September 3d, and smelting operations will soon begin. The company, it is stated, has expended nearly \$4,000,000 in mining development, machinery, and building.

PARROT.—The new works of this company will start up about the first of October.

NEVADA.

ELKO COUNTY—TUSCARORA DISTRICT.

BELLE ISLE.—It is stated that this company has purchased the Grand Prize mill. In the 150-foot level of the mine, the grade of ore, it is reported, continues good, while an improvement is noticed in the width of the vein. The annual meeting takes place September 25th.

EUREKA COUNTY.

GENERAL SHIELDS SILVER MINING COMPANY.—This company has been organized for the object of locating, buying, selling, prospecting, and developing mining lands in Safford Mining District. The capital stock is \$10,000,000, in shares of \$100 each.

LINCOLN COUNTY.

The mining property owned by Felix Knight, in Silver Park Mining District, it is stated, has been bonded for \$80,000, in place of \$25,000, as has been reported. The property is bonded to a Mr. Eppley, of Salt Lake, for five months, with a forfeit of \$1000 a month, till the mining property is taken. Mr. Knight has obtained United States patents to the Summit, Roadside, and Sam Tilden claims, and owns a number of good prospects besides these. A large amount of ore has been stripped and exposed to view in these mines.

MAYFLOWER.—This company, operating on Canada Hill, was enjoined recently from working its mine by the hydraulic process. It will clean up and close down in a few days. It was the intention of the company to drift its claim at some future day, providing a channel was found in the hill, and the hydraulic-licking was done to demonstrate whether a channel exists there or not.

STOREY COUNTY—THE COMSTOCK LODE.

The Hale & Norcross, Savage, Chollar, and Potosi mining companies have entered into a contract with the Risdon Iron-Works, of San Francisco, for another hydraulic pump to be set on the 3000 level of the Combination shaft. Its capacity will be 500 gallons a minute in forcing to the Suro tunnel level, which is calculated as being 1600 feet below the Gould & Curry croppings. The present depth of the shaft, from mouth to bottom, is 2930 feet. The new pump will cost about \$51,500 under the new contract, and the expense will be shared among the companies in the following proportions: Chollar and Potosi each seven twenty-sixths, Hale & Norcross four twenty-sixths, and Savage eight twenty-sixths. The terms of payment are as follows: One third is to be paid in thirty days, another third in sixty days, and the remaining third on the completion, successful working, and acceptance of the pump. In round numbers, each of the companies will have something like \$4000 to pay every thirty days until the pump is all paid for. This work will not interfere with the prospecting operations in these mines.

Work was resumed in the east cross-cut of the 2150 level of the Alta, September 8th. They expect to reach the ore-vein in two weeks.

On the 1700 level of the Bonanza mines, they will drift in north of the ground bulkhead, to look for a continuation of ore-deposits that were worked at the time the fire occurred in the old timbers.

NEW JERSEY.

The gross iron ore tonnage over High Bridge Branch for the month of August, was as follows: Through to Phillipsburg and points beyond, 15,480 tons; local, to Chester and Stanhope, 567 tons; total, 16,048 tons.

The shipments over the Hibernia Mine Railroad for the month amounted to 4498 tons.

NEW MEXICO.

BERNALILLO COUNTY.

It is reported that the new Hell Cañon smelter, near Albuquerque, had been fired up, and was working to the entire satisfaction of the managers, and that the first run of bullion had been drawn.

GRANT COUNTY.

OLD MAN.—This mine, the discovery of which created some excitement about a year ago, has been sold to a Colorado syndicate. Over \$142,000 of high-grade ore has been shipped and sold since the discovery. The largest working is upon the eastern slope of the claim, into which a cut has been made 50 by 150 feet, which is worked in benches, and from which 150 tons of low-grade ore are thrown upon the dump daily. The richest ore, however, has been found upon the west end, where a cross-cut tunnel has been run to a distance of nearly 200 feet. The vein runs the entire length of the claim, and varies from ten to thirty feet in thickness. The ore is horn-silver and argentine or silver glance. Pockets of extremely rich ore are found in this deposit. The management purposes erecting a mill and working the mine vigorously. The facilities for doing this will be greatly increased by an extension of the Silver City, Deming & Pacific Railroad west, which has been surveyed through to Benson, Arizona, where it connects with the Guaymas division of the Atchison, Topeka & Santa Fé Railroad. This extension is to pass very near the mine, to which a branch will be run.

UTAH.

BEAVER COUNTY.

HORN-SILVER.—The hoisting-works built over the new working-shaft are finished and in complete running order.

SALT LAKE COUNTY.

EMMA.—Work is progressing rapidly on the new Emma mine at Alta. The new house is nearly completed, and the boilers are getting into position. Work will again be begun about October 1st, and a large force of men will be employed.

WASHINGTON COUNTY.

CHRISTY MINING COMPANY.—The purpose for which the corporation is formed is to carry on the business of mining and smelting in Harrisburg Mining District, to acquire mines, mill-sites, ditches, etc., and generally to do any matter or thing competent for a corporation to do under the laws of California. The principal place of business is to be at San Francisco, and the term of corporate existence is fixed at fifty years. Messrs. R. H. Graves, W. M. Lubbock, O. F. Griffin, F. A. Benjamin, and John H. Wise have been appointed directors for the first year. The capital stock is placed at \$1,000,000, divided into 100,000 shares of the par value of \$10 each.

VERMONT.

ROOKS.—The cross-cut beginning at the bottom of the winze has been driven 17 feet. A turn at right angles to the south has been made and advanced 10 feet towards the adit, which is in progress from the surface; 175 feet distance yet remains to be driven before the forces working toward one another will break through. The ore supplying the mill is taken from the vein between the north drift and hoisting-engine station.

WEST VIRGINIA.

A discovery of tin in Mason and Cabell counties is reported.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED JUNE 3d, 1884.

- 299,514. Method of and Apparatus for Compressing Plastic, Pulverized, and other Materials. Theodore C. Brecht, Washington, D. C.
 299,534. Smelting-Furnace. Abram Gibson, Hughesville, Mont.
 299,538. Tuyere and Attachment therefor. John M. Hartman, Philadelphia, Pa.
 299,572. Device for Operating Tuyere-Stoppers. Henry W. Oliver, Jr., Pittsburg, Pa.
 299,577. Hydraulic Concentrator and Amalgamator. Henry E. Pickett, Bradford, Pa.
 299,585. Coal-Tipple. William Rosenteel, Pittsburg, Pa., Assignor to Oliver Brothers & Phillips, same place.
 299,632. Boring-Tool or Detent-Terrier for Oil- Wells, etc. Albert Fauck, Kleczany Galicia, Austria-Hungary.
 299,637. Process of and Furnace for Smelting and Refining Ores. James K. Griffin, Brooklyn, New York.
 299,655. Mining-Machine. Benjamin A. Legg, Columbus, Ohio, Assignor to the Lechner Manufacturing Company, same place.
 299,656. Elevator for Coal and other Substances. John A. Lesourd and James Lotan, Portland, Oregon.
 299,666. Double-Acting Pump. James McGwin, Fulton, Mo.
 299,700. Amalgamating Apparatus. Milton T. Van Derveer and John Hegeman, Amsterdam, New York.
 299,727. Machine for Straightening Round Bars of Metal. Latham Brightman, Youngstown, Ohio.
 299,728. Machine for Straightening Round Bars of Metal. Latham Brightman, Youngstown, Ohio.
 299,772. Rotary Ore-Pulverizer. John B. Gagnon, Oakland Cal.
 299,824. Rotary Steam-Engine. James H. McVay, South Chicago, Ill.
 299,886. Drill-Chuck. Charles S. Westbrook, Spragueville, New York.
 299,909. Drill-Chuck. Charles E. Church, Cleveland, Ohio.
 299,920. Ore-Sampling Machine. Thomas T. Eyre, Decatur, Colo.

GRANTED JUNE 10TH.

- 299,965. Smoke-Consuming Furnace. Alexander Crawford, Duluth, Minn.
 299,974. Furnace. Lyman P. French, Boston, Mass.
 299,982. Sheet-Metal Cutting-Machine. John G. Hodgson, Chicago, Ill., Assignor to Edwin Norton and Oliver W. Norton, both of same place.
 299,991. Mining-Drill and Method of Forming Powder-Chambers in Rock, etc. William H. Lytle, Montezuma, Colo.
 299,998. Machine for Making Cores for Castings. John E. Morrison, Williamsburg, New York.
 300,035. Process of and Apparatus for Electro-Depositing Copper, Brass, etc. William Henry Waleen, Islington, County of Middlesex, England.
 300,038. Index-Gauge for Drilling-Machines. Albert B. Bean, New Haven, Conn.
 300,042. Dry Ore Separator. William L. Card and Joseph C. Dane, La Crosse, Wis., Assignors to the Card-Dane Dry Gold Sluice Company (Limited), same place.
 300,043. Dry Ore Separator. William L. Card and Joseph C. Dane, La Crosse, Wis., Assignors to the Card-Dane Dry Gold Sluice Company (Limited), same place.
 300,044. Dry Ore Separator. William L. Card and Joseph C. Dane, La Crosse, Wis., Assignors to the Card-Dane Dry Gold Sluice Company (Limited), same place.
 300,076. Mining-Machine. John R. Howells, Plymouth, and George Shelley, Wilkes-Barre, Pa.
 300,106. Amalgamator. Henry Moon, Thomasville, N. C.
 300,150. Feeding Air to Furnaces. Sidney Smith, Cambridge, Mass.
 300,175. Hoisting-Tower for Blast-Furnaces. Peter L. Weimer, Lebanon, Pa.
 300,181. Metallurgical Furnace. Thomas J. Wilson, Auburn, New York.
 300,184. Manufacture of Sheet Iron. W. Dewees Wood, Pittsburg, Pa.
 300,250. Rotary Puddling-Furnace. John Griffen and Jesse Hall, Jr., Phoenixville, Pa., Assignors to the Phoenix Iron Company, same place.
 300,283. Driving Mechanism for Fan-Blowers. John R. Rowlands, Brooklyn, New York, Assignor, by direct and mesne assignments, to Henry F. Read, same place.
 300,302. Machine for Seaming or Double-Seaming Joints of Sheet-Metal Roofing. Orrin W. Burritt, Weedsport, New York.
 300,324. Alloy for Coating Metals. Charles E. Manby, McKeesport, Assignor to Edmund C. Converse, Pittsburg, Pa.
 300,329. Valve for Hot-Blast Ovens. John J. Spearman, Sharon, Pa.

GRANTED JUNE 17TH.

- 300,400. Pump. Wilbur L. Shepard, Hartford, Conn.
 300,404. Method of Utilizing Old Rails. Gottlieb A. Steiner, Allegheny City, Pa.
 300,426. Machine for Washing and Concentrating Ores. Jacob C. Wiswell, West Medford, Mass.
 300,443. Means for Utilizing Compressed Air as a Motive Power. Charles E. Buell, New Haven, Conn.
 300,445. Manufacture of Wrench-Forgings. Luke Chapman, Collinsville, Conn., Assignor to the Collins Company, same place.
 300,469. Art of Constructing Tunnels. De Witt C. Haskin, New York City.
 300,479. Ore-Concentrator. William B. Kennedy and Watson M. Nesbit, Silver Reef, Utah.
 300,484. Concentrator. Ernest Koch, San Francisco, Cal.
 300,518. Combined Chain and Elevator-Bucket. Morrill A. Shepard, Lebanon, Ill.
 300,529. Quartz Crusher or Mill. Horatio Sutherland, London, England.
 300,580. Manufacture of Faving-Blocks from Furnace-Slag, etc. Charles James Dobbs, Middleborough, County of York, England.
 300,599. Process of and Apparatus for Crystallizing Tin. Charles R. H. M. Habenicht, New York City.
 300,657. Puddling and Heating Furnace. William Stubblebine, Bethlehem, Pa., Assignor to the Stubblebine Patents Company, same place.
 300,689. Hoisting and Conveying Machine. Alexander E. Brown, Cleveland, Ohio.
 300,690. Hoisting and Conveying Machine. Alexander E. Brown, Cleveland, Ohio.
 300,701. Wet Ore Concentrator. Willard B. Farwell, San Francisco, Cal., Assignor, by mesne assignments, to Fannie M. Farwell, same place.
 300,702. Pump. John R. Fisher and Leander T. Fisher, Knobnoster, Mo.
 300,703. Furnace. Michael A. Foster, St. Louis, Mo.
 300,726. Pump-Mo'or. Benjamin Franklin Opp, Havana, Ill., Assignor of one half to Orlando H. Wright and Horace A. Wright, both of same place.
 300,730. Manufacture of Combined Metal Plates. John Pedder, Pittsburg, Pa.
 300,747. Process of Treating Iron. Brock Woodruff, Albert Lea, Minn., Assignor to Warren Buel and Seth B. Tannehill, both of same place.

GRANTED JUNE 24TH.

- 300,752. Apparatus for Generating Gas or Vapor from Liquid Hydrocarbons. Augustin I. Ambler, Washington, D. C.
 300,758. Machine for Making Hook-Headed Nails. Benjamin Brazelle, St. Louis, Mo.
 300,787. Double Force Pump. M. Frank McNelly, Sterling, Ill.
 300,794. Double-Acting Pump. William Harvey Ormsby, Minneapolis, Minn., Assignor of one half to Lorenzo D. Hill and George A. Harper, both of same place.
 300,802. Process of and Apparatus for Manufacturing Illuminating Gas. Silas C. Salisbury, New York City, Assignor to Levi F. Rose, Yonkers, New York.
 300,803. Process of and Apparatus for Manufacturing Illuminating Gas. Silas C. Salisbury, New York City, Assignor to Levi F. Rose, Yonkers, New York.
 300,823. Turbine Water-Wheel. Abraham N. Wolf, Allentown, Pa.
 300,826. Process of Producing Steel from Wrought-Iron with Plumbago. W. A. Otto Wash, Pittsburg, Pa.
 300,853. Molding Apparatus for Castings. John R. Davies, Whitewater, Wis.
 300,880. Pump. Frank D. Maltby, New York City, Assignor to himself, De Borden Wilmot, and Wellesley W. Gage, same place.
 300,891. Method of and Apparatus for Sinking Shafts through Quicksand. F. Hermann Poetsch, Aschersleben, Russia, Germany.
 300,920. Bearing for the Spindles of Amalgamating Pans. Andrew Wallace, Leadville, Colo.
 300,925. Hydrant. John Ward, Lansingburg, New York, Assignor to the Ludlow Valve Manufacturing Company.
 300,941. Apparatus for Lining Molds. George W. Billings, Cleveland, Ohio.
 300,950. Process of and Apparatus for the Separation of Metals from Ores and Alloys. Henry Renner Cassel, New York City.
 300,951. Process of Chloridizing Ores by Electrolysis. Henry Renner Cassel, New York City.
 300,998. Rotary Engine. John Moffet, New York City.
 301,033. Apparatus for Concentrating Sulphuric Acid. Marinus Willett, Newport, R. I.
 301,048. Regenerative Furnace. Andrew Cuthbert, Pittsburg, Pa.
 301,049. Hand Rock and Coal-Boring Machine. Benjamin B. Davis, Williamstown, Pa., Assignor of one half to Thomas D. Davis, same place.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Sept. 19.

The mining stock market during the past week has shown a marked improvement. The transactions amounted to 54,470 shares, against 29,900 shares for the previous week, showing an increase of sales this week of 24,570 shares. The dealings in the different stocks were without special interest, and show no great fluctuations in prices. A complete summary of the market is given below.

Among the Comstock shares, Consolidated Virginia was largely dealt in, the price ranging during the week from 25@30c., and the sales amounting to 12,030 shares. The price of Sutro Tunnel ranged from 16@17c. Sierra Nevada sold at irregular prices under a fair business; it was quoted at from \$1.45@1.60. California sold at from 33@35c. A small business is recorded in Union Consolidated, showing prices ranging from \$1.20@1.35c. A few shares of Mexican were sold at from \$1.60@1.75.

The Tuscarora stocks show a small business at steady prices. Navajo was sold at prices ranging from \$3.95@3.90. A few shares of Belle Isle were sold at from 50@53c.

The Bodie stocks have received but little attention. Bodie sold at from \$2.00@2.30; Standard at from \$1.25@1.30; Goodshaw at 10c.; and Bulwer at from 53@57c. Consolidated Pacific was the favorite stock of this group, and 2400 shares were sold, with prices ranging from 60@63c.

The Leadville stocks were almost neglected. But one transaction is recorded of Amie at 6c., and of Little Chief at 30c. Breece was more actively dealt in, and shows sales of 2200 shares at from 25@28c. Climax is quoted at 2c.

In the miscellaneous list, Alice sold at \$2.60; Bas-sick, \$5@55.50. A moderate business was done in Eureka Consolidated; it was strong, and ranged from \$3@4. Green Mountain sold at from \$1.80@1.75. Horn-Silver was quiet, selling at from \$5.75@6. Central Arizona was moderately dealt in, and sold at from 20@22c. Oriental & Miller at 13c. State Line Nos. 1 & 4 and Nos. 2 & 3, at from 3@5c. Rappahanock quite active, at prices ranging from 15@13c. One sale of 1000 shares of Harlem is recorded at 10c.

MEETINGS.

Agogeebic Iron and Pine Land Company, Hancock, Mich., annual meeting of stockholders October 6th, at three o'clock P.M.

Bull's International Iron and Steel Company, Nos. 100 and 102 Broadway, New York City, annual meeting of stockholders, October 8th, at two o'clock P.M.

Horn-Silver Mining Company, Frisco, Utah, annual meeting of stockholders October 7th, at twelve o'clock M.

DIVIDENDS.

Barclay Coal Company, of Pennsylvania, announces a semi-annual dividend of three per cent, payable September 15th.

Father de Smet Mining Company, of Dakota, has declared a dividend of twenty-five cents a share, payable at the office of Laidlaw & Co., No. 14 Wall street, September 30th.

Homestake Mining Company, of Dakota, has declared a dividend (No. 73) of \$25,000, payable at the office of Messrs. Lounsbury & Haggin, No. 15 Broad street, September 25th. Total dividends to date, \$2,512,500.

Idaho Gold Mining Company, of California, has declared a dividend (No. 180) of \$7.50 a share, payable on and after September 1st.

Leadville Consolidated Mining Company, of Colorado, has declared a dividend (No. 10) of \$20,000, or five cents a share, payable September 29th.

Osceola Mining Company, of Michigan, has declared a dividend (No. 20) of twenty-five cents a share, payable at the office of the company, No. 69 Devonshire street, or No. 246 Washington street, Boston, Mass., October 1st, to stockholders of record September 20th.

Reading Iron-Works, of Pennsylvania, have declared a quarterly dividend of one and three quarter per cent on the preferred stock of this company, payable on demand, at the company's office, No. 259 South Fourth street, Philadelphia, Pa.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week ended Friday, September 19th: Last Saturday, the market opened at 76% c. and last night it closed 76% c. bid.

Within the week, 79% c. was the highest and 73% c. the lowest price. The Phillips well at Baldrige, Butler County, has maintained its production for the past three weeks at about an average of 70 barrels an hour. The Johnson well in this vicinity will be opened within a week, and the trade is awaiting with much interest its showing. Consequently, the present week has been a dull and waiting one, and the trade is pretty much out of the market, ready to jump in either direction. The export trade is heavy, and the average for the month so far is about 57,000 barrels a day, which is the largest for any month this year, and within 10,000 barrels a day of the production. This, if continued, will insure a reduction of stocks. The shipments from the oil regions are about 7500 barrels a day in excess of the receipts. We shall be very glad at any time to furnish your readers with any information we may have.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Sept. 13....	\$0.76%	\$0.79	\$0.76	\$0.78%	5,218,000
15....	.79	.79%	.75%	.75%	7,589,000
16....	.75%	.77%	.73%	.75%	8,251,000
17....	.75%	.77%	.74%	.77%	8,387,000
18....	.77%	.77%	.76	.76	5,102,000
19....	.76	.76%	.75%	.76%	5,122,000
Total sales....					39,869,000

SAN FRANCISCO MINING STOCK QUOTATIONS.
Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS.					
	Sept. 12.	Sept. 13.	Sept. 15.	Sept. 16.	Sept. 17.	Sept. 18.
Albion.....						
Alpha.....						
Alta.....	2.12%	2.12%	2.00	1.87%	1.62%	1.75
Argenta.....						
Bechtel.....		.90			.80	.90
Belle Isle.....						
Best & Belcher.....	2.25	2.25	2.25	2.25	2.25	2.12%
Bodie.....	2.00	2.00	2.00	2.00	2.25	2.00
Bullion.....						
Bulwer.....						
California.....	.30		.30	.30	.30	.35
Chollar.....	2.25	2.25	2.25	2.25	2.25	2.12%
Con. Pacific.....		.60	.65		.60	
Con. Virginia.....	.25	.25	.25	.20		.20
Crown Point.....	1.37%	1.25	1.37%	1.37%	1.37%	1.25
Day.....						
Elko Cons.....						
Eureka Cons.....		3.25		3.25	3.25	3.37%
Exchequer.....						
Gould & Curry.....	2.00	2.00	2.00	2.00	2.00	1.87%
Grand Prize.....						
Hale & Norcross.....	3.00	3.00	3.25	3.25	3.12%	3.12%
Independence.....						
Martin White.....						
Mexican.....	1.75	1.75	1.62%	1.62%	1.62%	1.50
Mono.....						
Mount Diablo.....					2.25	
Navajo.....	3.75		3.50	3.50		3.62%
Northern Belle.....						
Ophir.....	1.25	1.37%	1.37%	1.37%	1.25	1.25
Overman.....						
Potosi.....	1.37%	1.37%	1.50	1.37%	1.37%	1.37%
Savage.....	1.37%	1.37%	1.37%	1.37%	1.37%	1.25
Scorpion.....						
Sierra Nevada.....	1.50	1.50	1.50	1.50	1.50	1.37%
Silver King.....						
Tip Top.....						
Union Cons.....	1.25	1.37%	1.25	1.25	1.25	1.25
Utah.....	.80	.85		.85	.75	1.25
Wales Cons.....						
Yellow Jacket.....	2.00	2.00	2.00		1.75	

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, Sept. 18.

The past week has been marked by extreme dullness in the market for copper stocks. About all the dealings have centered in Quincy, which has been freely pressed for sale, and shows a further decline from \$23% @ \$28, with sales of about 300 shares. At this price, there seem to be buyers who have confidence in the property and in its ability to produce copper at a fair profit, even at 13 cents, and pay a good percentage on the investment, and all stock offered at \$28 is freely taken; closing to-day at \$28 bid, \$29 asked. Calumet & Hecla declined on very small sales from \$164% @ \$160, and it would be very difficult to sell a round lot unless at a considerable concession from these figures; in fact, the stock was offered to-day at \$158 without takers, and \$156 bid for a small lot only. A small lot of Franklin was sold at \$5, a decline of \$2 from the last sale, but \$5 is bid for round lots, and none offered under \$7. The delinquent stock of the Huron Copper Company was sold yesterday at \$1 @ \$1%, the amount being about 4000 shares. Another assessment is probable in the near future, as the company still has a

floating debt, and at the present price of ingot, there is not much profit in mining, the cost of production being about 12 cents. Osceola is offered at \$11, no bid or sales. This company has reduced its quarterly dividend from 50c. to 25c. a share, the result of the decline in ingot. Atlantic is in fair demand at \$3 bid, \$7% asked, without sales.

In silver stocks we note sales of Catalpa at 25c. and Crescent at 10c., both of which are in good demand at these rates. Bonanza is wanted at \$1; none offered at less than \$1%. At the Boston Mining Exchange, there is but little improvement to note in activity or prices. Bowman Silver declined from 13@10c. on small sales. Dunkin is in fair demand at 23c. bid, 25c. asked ex dividend, with sales at 24c. The August product of this mine, owing to unusually heavy expenses, yielded only about \$1200 net, but the present month will doubtless show an improvement. There has been some demand for Breece, with sales at 23@24c. Nothing doing in Sullivan, or the Water Meter stocks.

3 P.M.—There were no sales at the afternoon Board, but prices were a little firmer. For Quincy, \$28% was bid, and none offered. For Calumet & Hecla, \$160 was asked, but no bid. Pewabic, \$1% bid. Huron, \$1 bid.

BULLION MARKET.

NEW YORK, Friday Evening, Sept. 19.

DATE.	LONDON.		N. Y.	
	Pence.	Cents.	Pence.	Cents.
Sept. 13	50 11-16	110%	50 11-16	110%
15	50 11-16	110%	50 11-16	110%
16	50 11-16	110%	50 11-16	110%

* 110% @ 110%.

BULLION PRODUCTION FOR 1884.

MINES.	States.	Month of August.	Year from Jan. 1st, 1884.	
			\$	\$
*Alice, g. s.	Mont.	+	520,843	15,861
*Belmont.....	Mont.		7,780	19,600
*Black Bear.....	Cal.		396,063	211,904
Bodie, g.	Cal.		309,800	209,800
*Bonanza King, s.	Cal.		36,265	73,511
*Boston & Montana, g.	Mont.		98,478	57,071
*Caledonia.....	Dak.		314,929	260,923
*Crysolite, s. L.	Colo.		106,280	267,637
*Consolidated Bobtail, g.	Colo.		25,000	320,052
*Contention, s. g.	Ariz.		107,000	732,036
*Deadwood-Terra, g.	Dak.		607,988	39,301
*Derbec Blue Gravel, g. s.	Colo.		1,444,000	581,556
*Father de Smet, g.	Dak.		638	21,215
Grand Prize, s.	Nev.		102,630	812,109
*Hecla Cons., g. s. L. c.	Mont.	+	56,304	516,161
*Helena, s. L.	Mont.		84,014	24,820
*Homestake, g.	Dak.		52,788	296,485
*Hope, s.	Mont.		5,874	1,021,841
Horn-Silver, s. L.	Utah		29,724	22,378
*Iron Silver, s. L.	Colo.		87,950	702,416
*Kentuck, g. s.	Nev.		28,661	18,016
*Lexington, g. s.	Mont.		117,595	98,078
*Little Pittsburg, s.	Colo.		370,078	7,174
*Moulton, g. s.	Mont.			
*Mount Diablo, s.	Nev.			
*Murchie.....	Cal.			
*Navajo, g. s.	Nev.			
*North Belle Isle.....	Nev.			
*Ontario, s. L.	Utah			
*Original, s. c.	Mont.			
*Oxford, g.	N. S.			
*Paradise Valley, s. g.	Nev.			
*Plymouth Consolidated, g.	Cal.			
*Rooks, g.	Vt.			
*outh Yuba, g.	Cal.			
*Stormont.....	Utah			
*Syndicate, g. s.	Cal.			
*Tombstone, s. L.	Ariz.			
United Gregory, g.	Colo.			

Total amount of shipments to date.....\$10,458,512

* Official † Assay value. ‡ Not including value of lead and copper. ** Silver valued at \$1.05 an ounce. G. Gold; S. Silver; L. Lead; C. Copper. — No bullion produced.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate of discount, and it remains at 2 per cent. During the week, the bank lost £335,383 bullion, and the proportion of its reserve to its liabilities was reduced from 45% to 45%, against 46% per cent at this date last year. September 18th, the Bank gained £7000 bullion on balance. The weekly statement of the Bank of France shows gains of 3,820,000 francs gold and 3,078,000 francs silver. The weekly statement of the Imperial Bank of Germany shows a special loss of 3,882,000 marks.

Silver Purchase for the Mints.—The Treasury Department, September 18th, purchased 400,000

ounces of silver for delivery at the New Orleans and Philadelphia mints.

METALS.

New York, Friday Evening, Sept. 19.

Copper.—Naturally there is very little doing so soon after the Lake sale. We quote, nominally, 13@13½c. for Lake, first hands asking 13½c., and 12@12½c. for other brands.

London cables £54 2s. 6d. for Chili Bars and £59 for Best Selected.

According to the Board of Trade returns for the United Kingdom, the imports and exports of copper during the first seven months of the following years, estimated in fine, were as follows:

	1884.	1883.	1882.
	Tons.	Tons.	Tons.
Imports—			
Copper in ores and pyrites	19,168	17,210	18,243
Regulus	17,425	16,314	13,620
Bars, etc.	2,747	20,247	19,088
Tons	59,340	53,671	50,951
Exports—			
Manufactured copper, etc.	21,867	18,018	17,119
Unmanufactured	10,858	9,736	6,870
Foreign	7,273	7,203	6,875
Tons	39,998	34,957	30,864

Messrs. James Lewis & Son, of Liverpool, say in their monthly report, just received:

In addition to the sales reported, some 17,000 tons of American ore have been sold on private terms, for delivery during the next four months, the chief portion being on the basis of Chili Bars at the time of delivery. To these large forward sales we mainly ascribe the present low price of copper, in view of the fact that twelve months ago the visible supply from other sources was 7396 tons greater than at present, while values were £10 5s. higher. Smelters have now little or no interest in supporting the market. From the annual reports for 1883, recently issued, it appears that the cost of production to the Cape Copper Company was 8s. per unit of copper sold, and to the Quebrada Company 11s. 2d. per unit. The export duty on copper in Chili has been removed. It amounted to about \$6, or 16s. 3d. per ton, at the present rate of exchange. The arrivals here from the United States consist of 204 bars, 356 matte, and 4283 ore, equal to about 1878 tons fine copper.

The sales of furnace material have been:

Aug. Tons.	Per cent.	At	Per unit.
1,557 Ore...Italian (low produce)	25	9s. 6 to 9s. 8	3d
1,777 " " " " " "	"	"	3d
5,500 Prec. English	"	"	11s 0d
6,890 Reg. Chili	45	Swn. 10s 6d	6d
6,711 Kern. New Quebrada	10	"	9s 9d
7,105 Prec. Mason's, from wharf	"	Liv. 10s 4½d	"
8,100 " " " " " "	"	"	3d
8,310 Ore. Bilbao	"	Swn. 10s 0d	"
8,153 " " " " " "	"	"	10s 0d
14,611 Reg. Bolivian	45	"	10s 3d
18,176 Ore. " " " " " "	20	"	10s 0d
18,147 " " " " " "	20	"	10s 0d
18,838 " " " " " "	10	Liv. 9s 6d	"
18,200 Prec. Spanish	"	Swn. 10s 3d	"
18,300 Ore. Garonne	"	"	9s 9d
18,500 Prec. English	"	"	10s 9d
20,250 " " " " " "	"	Liv. 10s 3d	"
28,250 " " " " " "	"	"	10s 9d
28,145 " " " " " "	"	Liv. 10s 0d	"

Imports of other than Chili copper into Liverpool and Swansea during the first eight months of the following years (in tons fine):

	1882.	1883.	1884.
From United States	460	5,314	9,724
Canada	209	317	266
Mexico	202	206	204
Peru	738	364	310
River Plate	172	289	105
New Quebrada	1,853	2,667	2,558
Newfoundland	995	737	224
Spain	240	1,047	2,260
Portugal	"	86	214
Italy	1,005	572	540
Norway	304	125	235
Cape of Good Hope	2,809	3,090	3,017
Australia	112	160	419
Sundries	531	745	222
Precipitate	6,283	6,994	6,951
	15,913	22,833	27,449

Tin.—The market has been dull with Straits spot at 18½@18¾c., large lines, and London cabling £81 10s.

Lead.—The market continues to drag under the peculiar influences which have weighed on it in the past few weeks. Some parties are selling in a small way at 3-55c., while others report sales aggregating about 200 tons at 3-60c. We are now in the midst of the busy season, and manufacturers are by no means oversupplied with raw material. If lead is to be shaken out of its lethargy, the time for it is at hand, since the season will be over in a little more than a month. We quote 3-55@3-60c. for Common and Refined.

Messrs. John Wahl & Co., of St. Louis, telegraph to us as follows to-day:

No particular features have arisen during the past

week. Prices seem to have touched bottom and are firmer at the current quotations. Buyers seem to have more confidence in the market, and are looking about more freely. The event of the week has been the sale of about 300 tons of Refined at 3-40c. and 250 tons of Chemical lead at 3-37½c. Stocks in the hands of holders are only limited.

Messrs. Everett & Post send us the following dispatch from Chicago to-day:

Our market is quiet and dull, and prices remain unchanged at nominally 3-40c. The demand is only moderate, and there is very little doing, sales being chiefly of Refined lead. The stocks are increasing, but holders, anticipating better prices here, have withdrawn from the market at present, and refuse to make sales for future delivery at present prices beyond October. Consumers are not anxious, therefore little business is done.

Spelter.—There is no material change. Parties outside of the Western combination are offering at 4-55c., which we quote. London cables £14 7s. 6d. for Silesian.

Antimony.—There is nothing new to report.

IRON MARKET REVIEW.

New York, Friday Evening, Sept. 19.

American Pig.—Except the continued scarcity of first-class brands of No. 1 Foundry, there are no special features to note.

We quote standard brands: No. 1 Foundry, \$20 @ \$21; No. 2, \$18 @ \$19; and Gray Forge, \$17 @ \$18, with outside brands about \$1 lower. Foreign Bessemer is nominally \$19 @ \$19.50. Spiegeleisen has sold at \$26.75, and is freely offered at that figure for 20 per cent.

Scotch Pig.—Business continues very light.

We quote ex ship and to arrive: Langloan, \$21.50; Summerlee, \$20.75; Dalmellington, \$20; Gartsherrie, \$21; Eglinton, \$19.25 @ \$19.50; and Glengarnock, \$20 @ \$20.50.

At the Metal Exchange, the following cable quotations have been received: Coltness, 59s. 6d.; Langloan, 54s. 6d.; Summerlee, 52s. 6d.; Gartsherrie, 52s. 3d.; Glengarnock, at Ardrossan, 49s. 6d.; Dalmellington, 47s.; and Eglinton, 43s. 6d. Warrants, 41s. 10d.

Steel Rails.—Months ago, when rails were selling at \$35 @ \$37, a movement was begun looking to some arrangement between the rail mills, by which the output was to be kept within the limits of the demand. Some of the very mills that then objected are now coming forward with proposals to agree upon some arrangement by which the present slaughtering shall be ended, and at least cost be realized. No discussion of details has yet been entered upon, but there is certainly a much better chance that some kind of a pool will be made.

Sales during the week aggregate from 8000 to 10,000 tons, at \$27.50 chiefly.

Old Rails.—The market is dull. We quote nominally \$17.50 @ \$18.

Philadelphia, Sept. 19.

[From our Special Correspondent.]

Pig-Iron.—The general condition of the pig-iron market is about as last reported. There is perhaps a little more activity in small lots and more inquiry, and, as there are no surplus stocks of good irons, more firmness is observed. Concessions are harder to obtain. There are very few heavy transactions reported, but the aggregate of business is larger than for several weeks. Prices are substantially the same, standard brands of No. 1 Foundry selling at from \$19 @ \$20; No. 2 at \$18 @ \$18.80; and Gray Forge at \$17 @ \$17.50.

Foreign Iron.—A sale of 2000 tons of 20 per cent Spiegeleisen was made to the Pennsylvania Steel Company at \$26.75. Stocks are to be had for shipment at \$26.50. Bessemer is quiet and dull at \$19 @ \$19.50. Steel Blooms are quoted at \$40 @ \$42.

Bar-Iron.—There is more demand for refined iron, but small lots are generally called for, and prices show no change. The mills have not been able to secure much work ahead, and competition is therefore as active as ever, and prices very low. Refined is quoted at 1-80 @ 1-90c., and Common, from 1-60 @ 1-80c., according to quality.

Muck-Bars.—A very dull demand is kept up for Muck-Bars. Prices for ordinary qualities range from \$29 @ \$30, with more asked for best.

Blooms.—Quotations are given at \$52 @ \$55 for

Charcoal, and \$42 @ \$44 for Anthracite, according to quality, with inferior kinds selling a little lower.

Plate and Tank-Iron.—Some good sales have been made, but nothing of much importance. A good many small orders are coming in, and there is a good deal of work in sight, which our manufacturers hope soon to secure. Plate and Tank are quoted at 2-10 @ 2-15c.; Shell at 2-75c.; Flange at 3-75c.; and Fire-Box at 4-25c.

Structural Iron.—From 1500 to 2000 tons of construction iron have been ordered during the week, one 500, one 700, and several smaller lots, but there are no important orders before the market at present. A good deal of business is in prospect, and manufacturers expect to secure a good deal of work this fall, but consumers are rather backward. Prices are weak for large lots, but for small lots are steady at 2-10c. for Angles, 2-25c. for Bridge Plates, 2-75c. for Tees, and 3-50c. for Beams and Channels.

Nails.—Prices paid range from \$2.10 @ \$2.20 for iron nails, and a little more for steel. A good deal of business is done, but the lots are mostly small.

Sheet-Iron.—Prices for sheet-iron are unchanged, and there is more business doing.

Wrought-Iron Pipes.—The combination rates are nominally unchanged, but mean nothing, as manufacturers are selling material at all sorts of prices. Large buyers are afraid to risk placing orders on the market while it is so unsteady, and very few large lots have been bought.

Steel Rails.—Prices for rails vary from \$27 @ \$28, according to size of order. There is an active demand, and prices will probably improve a little further, although \$28 will probably be the limit, even for small lots. From 18,000 to 20,000 tons have been ordered at Eastern mills within a few days, and inquiry is still active.

Old Rails.—Prices vary very much, according to size of order, quality of rails, and delivery. There are buyers of considerable lots at \$17.50, with holders asking \$18.

Scrap-Iron.—There is more activity in small lots, but prices are very irregular. Best No. 1, \$20 @ \$20.50. Foreign, car-load lots, \$19.

COAL TRADE REVIEW.

New York, Friday Evening, Sept. 19.

Anthracite.

Grudgingly the agreement has been reached by the companies to stop work in the week beginning September 29th, practically, therefore, the first week of October. We need hardly add that this half-measure is in no way calculated to lift the trade out of its present condition, in which we can record no improvement whatever. We discuss the situation editorially.

Mr. John H. Jones, official accountant, has issued the following statement of the anthracite coal tonnage for the month of August.

This statement includes the entire production of anthracite coal, excepting that consumed by employes, and for steam and heating purposes about the mines:

	August, 1884.	August, 1883.	Difference.
Phila. & Reading RR	1,390,703	1,317,954	I. 72,749
Lehigh Valley RR	663,844	615,612	I. 48,232
Del., Lack. & W.-st. RR	600,412	557,487	I. 42,925
Del. & Hud. Canal Co.	+418,587	361,281	I. 57,305
Pennsylvania RR	317,316	266,533	I. 50,782
Pennsylvania Coal Co.	173,161	167,685	I. 5,476
N. York, L. E. & W. RR.	48,448	38,158	I. 10,290
Total	3,552,410	3,324,711	I. 227,699

	For Year 1884.	For Year 1883.	Difference.
Phila. & Reading RR	6,993,011	7,735,089	D. 742,077
Lehigh Valley RR	3,743,209	3,962,082	D. 218,873
Del., Lack. & West. RR	3,233,347	3,202,202	I. 31,145
Del. & Hud. Canal Co.	2,121,086	2,171,705	D. 50,618
Pennsylvania RR	2,659,173	1,716,111	I. 943,062
Pennsylvania Coal Co.	874,760	942,465	D. 67,705
N. York, L. E. & W. RR.	237,693	221,512	I. 16,181
Total	19,314,279	19,951,165	D. 636,886

* This amount includes 1,745,395 19 tons carried by the Central Railroad of New Jersey during the first five months of 1883.

† In addition, there were 70,936 tons transported from mines by the Delaware & Hudson Canal Company, during August, which is included in tonnage of other interests. The stock of coal on hand at tide-water shipping points, August 31st, 1884, was 685,715 tons; on July 31st, 1884, 672,267 tons; increase, 213,448 tons.

NEW YORK MINING STOCKS.
DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.										SALES.	NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.										SALES.				
	Sept. 13.		Sept. 15.		Sept. 16.		Sept. 17.		Sept. 18.				Sept. 19.		Sept. 13.		Sept. 15.		Sept. 16.		Sept. 17.			Sept. 18.		Sept. 19.	
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.			H.	L.	H.	L.	H.	L.	H.	L.	H.	L.		H.	L.	H.	L.
Alice, Mon.											2.00	100	Albion														
Amie Con., Co.										.06	400	American Flag															
Argenta										5.00	315	Barcelona, G.															
Bassick, Co.	5.50									5.00	900	Belvidere															
Belle Isle, Ne.	.58									2.25	750	Best & Fieher, G. S.															
Bodie Cons., Ca.	2.00	2.30								2.25	2,300	Big Pittsburg, S. L.															
Breece, Co.	.28									.25	600	Bradshaw, S.															
Bulwer, Ca.										.57	5,900	Bull-Domingo, S. L.															
California, Ne.					.35		.34	.35	.35	.35		315	Central Ariz'na														
Cal. & Hecla, Mich.										.35		Climax, Co.															
Castle Creek												Colorado Central															
Chollar												Cons. Imperial															
Chrysolite, Co.												Con. Pacific	.60		.60	.61	.61	.61	.61	.63	.63	.63		2,400			
Cons. Va., Ne.	.25		.25		.22	.21	.23	.21	.25	.23	.24	12,130	Decatup														
Copper Queen												Durango, G.															
Dunkin, Co.												Eastern Oregon															
Eureka Cons., Ne.	3.25	3.00	3.75		4.00		3.75	3.50	3.50		1,070	Goodshaw, G.															
Father de Smet, Dk.												Harlem M. & M. Co.															
Findley, G.												Lacrosse, G.															
Gold Stripe, Ca.												Mariposa Pref., G.															
Gould & Curry, Ne.												Com. G.															
Grand Prize, Ne.												Mexican, G. S.															
Green Mountain, Ca.					1.75		1.80				900	Mono															
Hale & Norcross, Ne.							3.15				500	N. Horn-Silv'r, S. L.															
Hall-Anderson, N. S.												Orin't'l & Miller, S.															
Homesake, Dk.												Stappannock, G.	.14	.13													
Horn-Silver, Ut.					5.88					5.88	1,000	Red Elephant, S.															
Independence, Ne.												Ruby, of Arizona															
Iron Silver, Co.												Silver Cliff, S.															
Leadville C., Co.												Sonora Con.															
Little Chief, Co.												South Bodie, G.															
Little Pittsburg, Co.												South Bulwer, G.															
Martin White, Ne.												South Hite															
Navajo, Ne.	3.90		3.80				3.80	3.75	3.81		1,400	South Pacific															
Northern Belle												State Line, 1 & 2															
North Belle Isle, Ne.												Nos. 2 & 3, S.															
Ontario, Ut.												Taylor Tunnel	.17	.16	.16	.17	.16	.17	.16	.17		.17			11,400		
Ophir, Ne.			1.30		1.30						400	Unadilla, S.															
Quicksilver Pref., Ca.												Unadilla, S.															
Com. Ca.												Unadilla, S.															
Robinson Cons., Co.												Unadilla, S.															
Savage, Ne.	1.40										100	Unadilla, S.															
Sierra Nevada, Ne.			1.55				1.50	1.40	1.55	1.45	450	Unadilla, S.															
Silver King, Ar.			4.00				4.00	4.00	3.95		450	Unadilla, S.															
Spring Valley, Ca.											100	Unadilla, S.															
Standard, Ca.											425	Unadilla, S.															
Stormont, Ut.												Unadilla, S.															
Tip Top, Ar.												Unadilla, S.															
Vizna, Ar.												Unadilla, S.															
Yellow Jacket												Unadilla, S.															

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 29,770 Non-dividend shares sold, 21,700.

Bituminous.

There is a slight scarcity of cars in the Clearfield region. In other respects, trade drags along, with low figures ruling, \$2.65 having been accepted in this city for good coal.

Philadelphia. Sept. 19.

[From our Special Correspondent.]

Stocks of coal at Port Richmond to-day are in the neighborhood of 63,000 tons, of which 30,000 are loaded. The Reading Company has virtually no coal, and finds a ready demand for every ton it can mine. This company is securing a slight advance over the prices that prevailed two weeks ago. There is no stock of egg or stove coal. Broken and pea are the only kinds that are abundant. The companies here have not had any official notification of a further suspension, notwithstanding the New York meeting; but it is known that there will be a stoppage either next week or the week after. Some of the papers are making a great many gratuitous statements in reference to the coal trade, but most of them emanate from reporters' brains. The particular policy of the companies has not yet been determined on; but it may be asserted positively that there will be as much restriction as is found necessary for the protection of present prices. The probabilities are strongly in favor of suspensions occurring frequently throughout the remainder of the year. If to-day's telegrams mean any thing, there is going to be a better demand for coal at an early date. People have returned from their summer trips; manufacturers are tired of waiting for a break in the "combination" that has no real existence; domestic consumers are preparing to fill their cellars. The New England markets will soon require heavy supplies; inquiries are now in hand for stocks of coal, which will enable the companies to stiffen prices a little, especially if the expected week's suspension takes place at an early day. A good deal of chestnut is going West; there is only a moderate movement of coal to the South. The local trade is more active, and a good movement is kept up from yards. The local manufacturing demand is also better, but it will not assume very heavy proportions, as there are no inducements offered to stock up heavily. The line trade is more active than it has been, but still far duller than it ought to be. The iron trade is sluggish, and until it improves, there will be no boom in the demand for anthracite. The Reading shipped 302,833 tons of coal last week, against 286,636 tons for

the corresponding week last year. The tonnage of this company, so far this year, is 8,704,956 tons, against 8,092,919 tons last year, an increase of 612,037 tons. The Schuylkill Canal figures for the week are 11,932, against 17,691 for the same week last year. Total to date this year, 318,433 tons, against 355,614 tons for the same time last year. The representatives of the five companies shipping coal to Western markets have returned, and [your correspondent learned from two of them that arrangements had been entered into that will probably put a stop to the cutting of prices in the West, at least for the present. The mischief was done by the railroads cutting rates for freight. Water rates are also badly cut, and even as low as 40c. to Chicago has been taken, and 70c. to the most remote points to be reached by water.

The bituminous coal trade, as usual, lacks any points of interest. The Clearfield production for the week is reported at 58,549 tons, against 47,087 tons for the same week last year—an increase of 11,462 tons. For the year to date, 2,170,100 tons, a gain of 200,260 tons over last year.

Buffalo. Sept. 18.

[From our Special Correspondent.]

The shipments of coal by lake to Western ports from Buffalo from the opening of navigation to date, exceed one million net tons. This statement takes in both anthracite and bituminous, but no separate classification is kept at the Custom-House, from which the quantity of each kind can be ascertained.

Two hours' interviewing this morning among prominent dealers elucidates the fact that there are no prominent features to be recorded in hard and soft coal trades. The former is in a critical condition, according to some, while others say that every thing is working satisfactorily. Cars continue in light supply. The receipts of anthracite by railroad are only moderate. Local trade is only for family requirements. Manufacturers are running light and are likely to continue light the rest of the year, as stocks of goods are large and demand limited.

Coke is quiet and unchanged; about \$4.40 per net ton on cars is the quoted price.

Two vessels loaded with coal have been sunk on the lakes during the gales of the past week, and one by collision. No lives lost.

There are good grounds for believing that the American Association for the Advancement of Science will hold its annual meeting in our city in the year

1886. The society could not do better, and it treasures lively feelings of pleasure associated with its visit to us on two former occasions.

Encouraging accounts have been received relative to Mr. Andrew Langdon's Enterprise colliery at Wilkes-Barre, Pa., since my last letter. The misfortune of the caving in of a portion of the mine has turned out to have been really to the advantage of the owner; but the details of the *modus operandi* are too long for publication. The works will be ready for the resumption of mining within thirty days, at a lessened cost of production.

The Lehigh Valley Company is reported to have purchased or assumed control of the Union Iron-Works, which have been idle for many years. It is said that it is the intention to remodel the works for the making of steel rails, etc.

Your correspondent wrote you some time since that the Fletcher Furnace, at Black Rock, would be closed as soon as the stocks of ore, etc., were worked up. Owing to the necessity for important repairs in the cupola and other parts of the building, which were necessary for continued operations, the works were closed permanently a few days since. The company has lost \$150,000 and over since it entered possession. The property will revert to the owners, and it is not known yet what will be done with it.

There has been a large excess of tonnage at this port over the receipts of coal, in consequence of the stoppage of the mines, and a very large proportion of the vessels left light. Even now, the arrivals of coal are meager, and captains are delayed in taking on their promised cargoes. Charters were made during the past week at the following rates: To Chicago and Milwaukee, 50c.; to Green Bay, Superior City, and Duluth, 60c. and contract; to Fort Mackinaw, 50c.; to Houghton, Portage, and Marquette, 70c.; to Detroit, 20c.; to Sandusky, 15c.; to Kincardine, 50c.; to Port Huron, 30c.; to Jackfish Bay, \$1; to Escanaba, 60c. Closing with vessels plenty and coal scarce; freights firm.

Shipments by lake from September 11th to 17th, both days inclusive, 49,370 tons; namely: 15,540 tons to Chicago, 12,400 to Milwaukee, 5050 to Duluth, 450 to St. Clair, 1000 to Port Huron, 950 to Sandusky, 480 to Green Bay, 2480 to Houghton, 1200 to Superior City, 920 to Marquette, 630 to Ste. Marie, 700 to Kincardine, and 600 to Jackfish Bay.

No engagements by canal for the week; the ship-

ments have been on the owner's accounts. The nominal rates to New York and Albany were \$1.50 and \$1.25 respectively, captain to pay unloading.

Receipts by lake for the week, none.
Receipts by Lake Shore & Michigan Southern Railroad for the week, 468 tons; 264 tons for Buffalo, and 204 tons for other points.

Receipts by canal for the week, 730 tons; shipments, 549 tons.

Receipts of coal at Duluth for the past week, 12,050 tons; total for the season, 215,547 tons.

Boston. Sept. 18.

[From our Special Correspondent.]

The coal trade continues in an unusually quiet position for this season of the year. Anthracite coal is only bought in a small way to keep stocks along. Dealers are for the most part well supplied, and are out of the market for the present. The companies must show more plainly their policy in the matter of restriction, unless they are content to do business "at this poor dying rate."

Quotations continue nominally unchanged, but no one pretends to pay company prices. Some outside coal is moving. There is little demand for any thing but stove sizes. Broken moves very slowly, and may be had at low figures. Our quotations continue nominally unchanged, as follows:

At New York, Stove, \$4.25; Broken and Egg, \$3.50@3.65; individual coals, \$4@4.10 for Stove, \$3.25@3.50 for Broken and Egg. At Philadelphia, \$3.90@4.05 for Stove, \$3.65 for Chestnut, \$3.35@3.50 for Broken and Egg, \$2.35 for Pea. Special coals, \$4.85@5 for Broken, \$5.35@5.50 for Stove.

The question of the demands for bituminous coal in this market has the same answer as that ancient conundrum about the snakes in Ireland—"There are none." An occasional cargo is disposed of, but dealers take care that very little comes on the market, as the wants of the trade are well supplied, and any thing offered on the market would need to be sold very low. There are no contracts in the market, and no signs of any, and there is therefore no test of the market for large lots, in deliveries ahead. Cargo lots, for immediate shipment, are selling at \$3.50@3.65 delivered. Manufacturers will be wary how they make contracts, except at way-down figures when the time comes.

We hear of no material change in the freight situation, and certainly of no improvement. Rates are still extremely low. Vessels from New York have been taken at 75 cents, under somewhat exceptional circumstances, and rates are wholly in favor of shippers. Prompt dispatch will get very low figures. Baltimore rates are steady at \$1.20. Philadelphia continues at the bottom figure. We quote: New York, 80c@90c; Philadelphia, \$1@1.10; Baltimore, \$1.15@1.20; Newport News, \$1@1.10; Richmond, \$1.15; Cape Breton, \$1.50; Bay of Fundy, \$1.30.

There is only a moderate retail trade, but the demand is increasing all the while. Dealers have no reason to change quotations. We quote for lots delivered:

White ash, furnace, and egg	\$5.50
" " stove and nut	5.75
Red ash, egg	6.00
" " stove	6.25
Lorberry, egg and stove	\$6.75@7.00
Franklin, egg and stove	7.50
Lehigh, furnace, egg and stove	5.75
" " nut	5.75

Wharf quotations: \$4.50, Broken; \$4.85, Stove.

STATISTICS OF COAL PRODUCTION.

Comparative Statement of the Transportation of Coke over the Pennsylvania Railroad for the week ended September 13th, and year from January 1st: Tons of 2000 pounds.

	1884.		1883.	
	Week.	Year.	Week.	Year.
Gallitzin & Mountain (Alleghany Region)	2,891	93,734	1,012	58,227
West Penn. RR.		24,865	1,333	72,117
Southwest Penn. RR.	41,695	1,569,493	42,080	1,474,035
Penn. & Westmoreland Region, Pa. RR.	3,497	134,577	4,052	156,487
Monongahela, Penn. RR.	892	53,818		
Pittsburg Region, Pa. RR.		136	605	2,982
Snow Shoe (Clearfield Region)	493	16,444	205	18,137
Total	49,468	1,893,087	49,287	1,776,965
Increase		116,122		

FREIGHTS.

Coastwise Freights.

Per ton of 2240 lbs

Representing the latest actual charters to September 18th.

Ports.	From Philadelphia.		From Elizabethport, Port Johnston, South Amboy, Hoboken, and Weehawken.
	From Philadelphia.	From Baltimore.	
Alexandria	.70@.80		
Annapolis			
Albany			
Baltimore	.58	1.20	
Bangor	.80+	1.20	
Bath, Me.	1.00@1.05		
Beverly	1.05		
Boston, Mass.	1.00@1.10	1.20@1.40	.70@.75
Bristol	1.00		
Bridgeport, Conn.		1.10	.50
Brooklyn		1.10	
Buffalo, N. Y.			
Cambridge, Mass.	1.10@1.15		.70@.75
Cambridgeport	1.10@1.15		.70@.75
Charleston, S. C.	.65@.75	.70@.80	
Charlestown	1.05		.70@.75
Chelsea	1.00@1.10		.70@.75
City Point			
Com. Pt., Mass.	1.15		.70@.75
E. Boston	1.10@1.15		.70@.75
East Cambridge	1.10@1.15		.70@.75
E. Greenwich, R. I.	1.00		.75
Fall River	1.00		.70@.75
Galveston		2.50	
Gardiner, Me.	1.15		
Georgetown, D. C.	.70@.80		
Gloucester	1.10		
Hartford			
Hackensack			
Hudson			
Lynn	1.15@1.20		
Marblehead	1.15		
Medford			
Millville, N. J.			
Milton			
Newark, N. J.		1.25	
New Bedford	.90@1.00	1.10	.75
Newburyport		1.35	
New Haven		1.10	.50
New London		1.10	.65
New-Berne	.90		
Newport	1.10		.70@.75
New York		1.05	
Norfolk, Va.	.60		
Norwich			.65@.70
Norwalk, Conn.		1.25	
Pawtucket		1.25	
Philadelphia			
Portland, Me.	.75	1.20	.70
Portsmouth, Va.	.60		
Portsmouth, N. H.	1.25	1.30	.90
Providence	.90@1.00	1.10	.70@.75
Quincy Point			
Richmond, Va.	.80		
Rockland, Me.			
Rockport			
Roxbury, Mass.	1.00		
Saco			
Sag Harbor			
Salem, Mass.	1.00@1.15		.75
Saugus			
Savannah		.90@1.00	
Somerset	1.00		
Staten Island		1.00	
Strenton			
Troy			
Wareham		1.25	
Washington	.75		
Weymouth			
Williamsbz, N. Y.		1.10	
Wilmington, Del.			
Wilmington, N. C.		.90@1.00	
St. Thomas, W. I.			

* And discharging. † And discharging and towing. ‡ 3c. Per bridge extra. § Alongside. ¶ And towing up and down. * And towing. ** Below bridge.

Comparative statement of the production of anthracite coal for the week ended September 13th, and year from January 1st:

Tons of 2240 Lbs.	1884.		1883.	
	Week.	Year.	Week.	Year.
Wyoming Region.				
D. & H. Canal Co.	106,407	2,561,834	100,158	2,732,513
O. L. & W. RR. Co.	133,330	3,430,233	115,149	3,424,704
Penna. Coal Co.	37,284	869,960	38,262	992,211
L. V. RR. Co.	36,329	944,339	25,768	955,808
P. & N. Y. RR. Co.	6,106	152,612	4,913	146,424
C. RR. of N. J.	*	*	*	1,202,078
Penn. Canal Co.	14,277	278,514	15,569	317,014
North & West Br. RR.	15,113	581,517	7,763	308,950
	348,846	8,819,009	307,582	10,079,702
Lehigh Region.				
L. V. RR. Co.	145,667	3,069,811	115,300	3,428,730
C. RR. of N. J.	*	*	*	1,126,889
S. H. & W. B. RR.	608	132,044		31,127
	146,275	3,201,855	115,300	4,586,746
Schuylkill Region.				
P. & R. RR. Co.	319,028	7,378,939	296,295	6,156,793
Shamokin & Lykens Val.	*	*	*	950,363
	319,028	7,378,939	296,295	7,107,156
Sullivan Region.				
St. Line & Sul. RR. Co.	1,222	44,633	1,811	44,906
Total	815,371	19,444,436	720,988	21,818,510
Increase				
Decrease		2,374,074		

* Included in tonnage of the Philadelphia & Reading Railroad.

Total same time in 1879	18,100,650 tons.
" " " " 1880	15,603,615 "
" " " " 1881	19,289,700 "
" " " " 1882	19,592,849 "

The increase in shipments of Cumberland Coal over the Cumberland Frauch and Cumberland & Pennsylvania railroads amounts to 128,792 tons, as compared with the corresponding period in 1883.

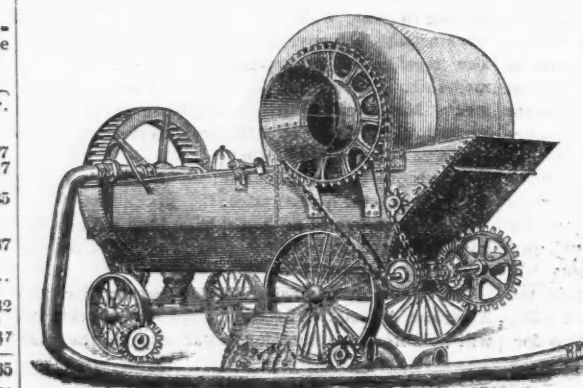
The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Comparative Statement of the Production of Bituminous Coal for the week ended September 13th, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.	1884.		1883.	
	Week.	Year.	Week.	Year.
Cumberland Region, Md.				
Tons of 2240 lbs.	64,510	1,952,080	61,420	1,738,034
Barclay Region, Pa.				
Barclay RR., tons of 2240 lbs.	4,625	209,244	5,175	220,412
Broad Top Region, Pa.				
Huntington & Broad Top RR., of 2240 lbs.	4,559	134,510	4,360	130,751
East Broad Top			412	27,806
Clearfield Region, Pa.				
Snow Shoe	3,251	126,218	4,427	162,472
Karhaus (Keating)	2,307	31,832		
Tyrone & Clearfield	57,778	2,167,659	46,422	1,953,849
Alleghany Region, Pa.				
Gallitzin & Mountain	9,543	264,421	6,450	300,248
Pittsburg Region, Pa.				
West Penn RR.	5,069	195,114	5,219	283,411
Southwest Penn. RR.	1,595	91,202	2,301	75,219
Pennsylvania RR.	3,670	193,790	13,522	413,578
Decrease				
Westmoreland Region, Pa.				
Pennsylvania RR.	26,750	906,324	23,636	973,467
Monongahela Region, Pa.				
Pennsylvania RR.	3,050	106,522		
Total	186,707	6,378,896	173,344	6,279,247
Increase		99,649		

JOSEPH P. PENNINGTON,
Civil and Mining Engineer,
137 Broadway (Room 9), New York.
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