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Contents

The Outlook for Copper

The trouble with copper heretofore has been that although consumption was increasing, production has been growing faster for the very simple reason that even on a 13-cent basis there has been a handsome profit to the producers. In December there was a recession in the production, due to accidental causes that affected some of the refineries. We do not take any stock in the talk of a deliberate curtailment of production on the part of anybody, and do not see any evidence of such, but it appears as if some important producers are refraining from increasing any further. Now the smelteries have been subject to the same kind of accidents that affected the refineries in December. There was the switchmens' strike in Montana, troubles over freezing of ore elsewhere, and in general the difficulties that follow from the wintry season. This has naturally restricted the smelters' production and in a month or two this will appear in the refiners' returns. Consequently, there is good reason to anticipate favorable statistics for two or three months to come, inasmuch as consumption is undoubtedly still expanding. We are inclined to be more optimistic as to the copper market than we have been for a long time.

Since the first of January the market has been halting. This has been perfectly natural in view of the situation in Wall Street. The connection between the latter and the copper market is close. Our producers have to sell nearly 50 per cent. of their output for export. The London market is largely affected by speculative transactions emanating from this side. When liquidation is the order of the day in Wall Street, the same people may have to sell out their commitments in copper in London, the price in that market may fall below ours and sales for export may temporarily cease. At the same time domestic buyers are apt to hold aloof in a period of gloom and uncertainty such as has dominated the stock market recently.

We think that this was the result of overspeculation, rather than the anticipation of a check to industrial activity in this country. It is true that the iron and steel business has been halting, but we have not received any such reports from the other metal industries; rather the reverse. The railways and builders still have a lot of work to do that was put off in 1907-8. We cannot believe that they have yet filled the requirements and are rather inclined to look for a resumption of progress. Now that valuations on the stock markets have been reduced to a sounder basis, we may soon expect more optimism as to everything than has been the rule during January.

The Distribution of Coal Cars

The distribution of cars to coal mines is such an important factor in their business that general satisfaction was expressed some time ago when the Interstate Commerce Commission interfered and ordered that no discrimination should be used on account of the ownership of cars by coal companies. The order then made directed that all the company cars must be included in the general stock upon which the distribution was based, and that no company should receive more than its equitable allotment—based upon productive capacity—because it owned

the cars. The original order given in the case of the Illinois Central and several other railroads in the Illinois district resulted in an appeal to the courts, and the case was carried up to the United States Supreme Court.

The Supreme Court has now rendered a sweeping decision, not only holding that the order in itself was correct, but upholding fully the authority of the Interstate Commerce Commission in the case. The court holds that in interstate commerce in coal the question of car distribution is an important factor and one which comes fully within the authority of the commission, although it is not specifically named in the law. A parallel case, in which suit was brought against the Baltimore & Ohio was remanded, but solely on technical grounds. In this case application was made by aggrieved coal companies to the district court, but the Supreme Court holds that the complaint should have been presented in the first case to the Interstate Commerce Commission as the proper authority in the case.

This decision apparently settles the car-distribution trouble, for the authority of the commission being fully established it would appear that it has necessarily the power to regulate and revise rules for such distribution, on proper complaints being made and proved.

Gold and Silver

The preliminary estimate of the director of the mint, made public a little later than usual, puts the gold production of the United States in 1909 at a total of $99,232,000, a figure considerably higher than the statistics heretofore available had led us to expect. This high value is due to a very large increase—$3,219,000—in Nevada, and to an unexpected gain of $1,941,600 in California, much of which was doubtless due to the extensive dredging operations in that State. Notwithstanding small losses in Colorado and Utah and a considerable one in South Dakota, the total for the United States shows an increase of $4,672,200 over that for 1908, and is, therefore, far the largest ever reported.

This increase over the earlier estimate makes the gold production of the world in 1909 a total of a little over $460,000,000, of which the United States supplied 21.5 per cent. Comparatively little of the new gold remained in the United States. The commercial returns for the full year show that the total exports were $132,880,821, and the net exports, after deducting all imports, were $88,793,855 for the year.

The silver production for the year, by the mint returns, was 53,849,000 oz., an increase of 1,408,200 oz. As was to be expected, the increase came from Montana, Utah and Arizona, all large copper producers.

The details of the mint estimate will be found on another page of this number. They show some interesting changes in the different States.

The Geology of Leadville

Probably the last word as to the geology of many important mining districts will never be said. In making their generally admirable reports, the scientists of the U. S. Geological Survey report the data that are available by careful study and summarize the data and draw their conclusions as best they may, but sometimes new discoveries quickly put things in a new light. This is not said in any spirit of criticism of the work of the geologists, but rather to indicate that the work of the U. S. Geological Survey will not be finished when it has examined all of the mining districts of the country; it never will be ended. Thus, in the work upon Leadville, respecting which the first report was made in the middle '80s, Dr. Emmons and his assistants have repeatedly visited that interesting camp and published supplementary reports. Doubtless he will continue to do so, at least we hope so, for many years to come.

The paper by George O. Argall, published in this issue of the JOURNAL, is an important new contribution to the geology of Leadville. It describes actual ore developments in the lower quartzite and fairly proves the close association of the ore shoots in the overlying limestone with the intrusions of gray porphyry, and fairly connects the small ore-bearing fissures in the Cambrian quartzite with the lower deposits in the white limestone. This may be sufficient to lead geologists in the future to correlate the ore deposits of Leadville with ascending solutions, intimately associated with the later eruptives, gray porphyry, rather than with descending solutions, although the latter were probably influential in creating the deposits at the first contact, between the white porphyry and the blue limestone. Possibly the verdict will finally be that no single theory is applicable to the entire Leadville district. We are sure that Mr. Argall's paper will be regarded as an important contribution and hope that our geological readers will contribute their views respecting his ideas.

The Steel Corporation Report

The report of the United States Steel Corporation for the last quarter of 1909 shows a recovery from depression almost as rapid as the decline in the closing months of 1907, and in 1908. The earnings of the quarter approached nearly the highest ever reported, and the total for the year is a gain of 43 per cent. over that of 1908. The accompanying table, giving the net earnings for two years by quarters, shows also how the business took a sharp upward turn from the time when the corporation reversed its previous policy of high prices and reduced output, and decided to meet conditions and deal with consumers on an open market.

The statement for the year compares with the previous year as follows:

	1908.	1909.
First quarter.....	$18,229,005	$22,921,268
Second quarter....	20,265,756	29,340,391
Third quarter.....	27,166,274	38,246,907
Fourth quarter....	26,225,485	40,971,309
Year.....	$91,886,520	$131,479,875

The largest net earnings reported in any previous quarter were $45,507,705 in the second quarter of 1907. The net earnings for 1909 show an increase of $39,593,355 over 1908. The appropriations for new construction, entirely suspended in 1908, were renewed last year, $18,200,000 being set aside for that purpose. The dividend policy of the corporation has been changed. In its most prosperous previous year only 2 per cent. was paid on the common stock, but that rate was continued through the year and a half of depression. In 1909, however, the quarterly dividend was increased, first from ½ to ¾ per cent., then from ¾ to 1 per cent.; while for the fourth quarter, in addition to 1 per cent. as in the third, an extra dividend of ¾ per cent. is to be paid, bringing the total for the year 1909 up to 4 per cent. and indicating an intention to put the stock on that basis.

The unfilled orders on the books Dec. 31 are reported at 5,927,031 tons, the largest quantity since Sept. 30, 1907. The increase during the quarter was 1,130,098 tons, which reflects the heavy buying of material for 1910 delivery which was noted in our market reports in October and November.

The United Mine Workers' Convention

The convention of the United Mine Workers in session at Indianapolis this week, has declared in favor of an increase in the coal-mining rate beginning April 1 to a general basis of $1 per ton. This will be an advance of from 10 to 15 per cent. on this year's rate. The operators' associations in Ohio, Indiana and Illinois, on the other hand, have resolved that a reduction of 10 or 15 per cent. in the wage rate is absolutely necessary in the existing condition of the coal trade. Both these declarations are part of the usual bluff, and it is probable that the conference to be held at Toledo next month will result, after prolonged discussion, in the adoption of rates not greatly differing from those now in force. The real trouble with the Western coal trade is not so much in the mining rate as in the capacity of the mines to produce coal to an extent far in excess of the demand.

The probabilities of a settlement of a compromise nature are based on the fact that both operators and miners realize that a general strike would give a great opportunity for expansion to the non-union mines of West Virginia and Kentucky. The competition of these mines is already severely felt, and a chance to increase their hold upon the trade would be a serious matter to their opponents.

One interesting point in the Indianapolis meeting was a strong declaration by President Lewis—whose reëlection had just been announced—against the policy of strikes. The strike, he said, was a harsh measure and a dangerous one, and should only be used as a last resort, when everything else had failed.

Another important incident was the appointment of a special committee to meet a circular committee from the Western Federation of Miners to consider the possibility of a union of the two bodies. The coal and metal miners' unions have always been distinct, and a federation of the two might have important results.

Columbus & Hocking

A scandal of the last week has been the collapse of the pool in the stock of the Columbus & Hocking Coal and Iron Company; or rather we should say the scandal has been of 10 months while the pool conducted its bald manipulation for the purpose of deceiving the public. The collapse was but the climax.

The Hocking company, capitalized at $7,500,000, owns some coal lands in Ohio. Organized in 1883, it became insolvent in 1896, was reorganized in 1898 and has never paid a dividend. In March, 1909, a pool of "financiers," comprising the president of the company, was organized to boost the stock of this moribund concern to fictitious values with the threadbare purpose of unloading upon investors, out of whom it would make something out of nothing.

By all the devices known to evil and loose-mouthed promoters, by the inspired stories of hired press agents, including reports of discovery of oil in the Hocking lands, by "inside tips" and wash sales, and the machinations of the arch manipulator the stock was raised from 21⅜ on Feb. 23, 1909, to 92½ on Jan. 4, 1910. Then one of the conspirators decided to betray his accomplices and the pool collapsed, the stock dropping in a few hours to about 25.

How long are the governors of the Stock Exchange going to permit such attempts at robbery? If they do not act promptly, the Legislature will surely act for them. The effrontery of the Rock Island and Hocking manipulators has been such that they have acted right under the nose of the Legislature with the report of the committee on speculation, indorsed by the Governor, before it.

We know that the authorities of the Stock Exchange have the checking of such evils prominently in mind. The unlisted department is to be abolished and the mining and industrial companies are to be required to make proper reports, just as the railways are. In this connection the listing committee of the Stock Exchange has wisely entered into conference with the Mining and Metallurgical Society of America, and may enact requirements such as were recommended last year by the latter. This will be a step in the right direction but it will not be enough. The Stock Exchange should investigate the Hocking transactions and mete out such punishment to the guilty as will effectively deter the tribe of thimbleriggers from inaugurating similar schemes in the future. The Stock Exchange must now do something drastic to compensate for sitting idly by while this flagrant manipulation was going on to the knowledge of almost everyone.

A New Coal Combination?

A despatch of somewhat doubtful origin comes this week from Charleston, W. Va., to the effect that options on 80 per cent. of the coal mines in the New River region have been taken, and that the parties concerned are seeking other options in the Pocahontas district. This, the despatch goes on to say, is in the interest of a great combination, which is to include not only the West Virginia mines mentioned, but also the Consolidation Coal Company, the Pittsburg Coal Company, the Berwind-White and other large interests in western Pennsylvania. There have been reports from time to time of great bituminous coal combination, but this somewhat mysterious despatch puts them for the first time on a definite basis.

The despatch goes further and mentions names. It appears that the holders of the West Virginia options and the general managers of the whole combination are the Guggenheims. Not satisfied with their smelting and mining interests, they are preparing to take up and manage the coal-mining business also. Whether their aspirations extend to the purchase of the anthracite mines also, we are not told. Perhaps it is best for us to remain in doubt for a while, at least.

It is pleasant to note from recent London advices that Stratton's Independence has once more paid a dividend. We hear from the mine that the dump ores are now being treated profitably. The material is of extremely low grade, but means have been developed for treating it at extremely low cost. The solution of this problem has been an uphill struggle, but it is the wrestling with difficult tasks that tends to develop the right class of men. Where there is little resistance, but little effort is necessary.

CORRESPONDENCE AND DISCUSSION

VIEWS, SUGGESTIONS AND THE EXPERIENCES OF READERS

The Corporation Tax on Mining Companies

I was especially interested in the editorial on the "Corporation Tax on Mining Companies" in the JOURNAL of Jan. 15, and hope for some discussion of a method for determining the depreciation, under the tax law, of the value of the property on account of the ore extracted during the year.

The JOURNAL seems to express the opinion that under the law no allowance can be made for depreciation of property on account of the ore removed. I do not think that the Treasury Department intends to interpret the law in that way, as the deputy commissioner replied as follows to a recent inquiry: "In reply to your query as to the manner in which the depreciation in the value of the mine should be determined, you are informed that in case of corporations whose capital investment represents the purchase of mines, oil wells, etc., in which there is a steady depreciation of the value of the property because of the depletion of the deposits and such depreciation is not ascertainable by an inventory, the shrinkage in the value of the capital investment account should be treated as depreciation in making the required return. The amount declared on this account must be a fair and just estimate of the actual amount of depreciation, and if such estimated amount be more than 5 per cent. of the amount actually invested in the property, a charge of capital investment account and detailed statement setting forth all the facts must be filed with and made a part of the required return."

From this I judge that it is the intention of the department to permit a depreciation charge on account of the extraction of mineral from the ground, but it seems to have a very vague idea of how the estimate should be made. Neither under the law nor in fact does 5 per cent. of the amount actually invested in the property seem to be a fair estimate of the amount of depreciation. I hope that before March 1, when returns under the law are to be made, someone will furnish us with a proper method of estimating the life of a mining property and the annual depreciation on account of the operation of the mine.

GORDON R. CAMPBELL.

Calumet, Mich., Jan. 20, 1910.

Copper Converter

Referring to a notation by Herbert Haas in the JOURNAL, Nov. 20, 1909, which in turn refers to an article of mine in the JOURNAL, Oct. 23, 1909, describing a modern type of barrel converter for copper matte, I wish to say that on account of my absence from Cananea this has only just been brought to my attention. It is not the purport of this letter to take up the question as to whether this converter is patented or not, and although Mr. Haas refers to this as having been covered, I will leave this question open for the time being. But I was particularly interested in his statement:

"An additional feature more valuable than the increased life of the lining is the arrangement of the tuyeres in such a manner as to generate a vortex in the fluid matte for the purpose of increasing the air efficiency in the copper converter, which at present is very low. This would result in more rapid oxidation of the charge, hence a reduction of the time required for blowing."

I would suggest that anyone is entitled to a generalized opinion, and to express it, but is Mr. Haas willing to commit himself to figures, and state what the difference would be in the efficiency of the air blown into the two types of converters illustrated? He says that it is very low in the present type, intimating that he has data bearing out this statement. Does his "low" mean a 20 per cent. efficiency, or 30, 60 or even a 99 per cent. utilization of the combining power of the oxygen contained in the blast? I do not mean the ultimate efficiency of the quantity of air supposed to be delivered by the blowing engines, but I mean the efficiency of the actual air that passes through the tuyeres and into and through the molten mass, for here is where he expects the improvement to be. The air which is lost previously is not seriously affected in a different manner by any type of converter (except that deep converters may offer more resistance, resulting in increased velocity of air through leak losses); this varies at different places, depending on the atention given the engine's pipe lines, safety valves, tuyere valves and other mechanical opportunities for leaks.

This is a subject that has been given considerable attention by managers and metallurgists at a number of large plants throughout the United States, Mexico and elsewhere. Large sums of money have been expended to increase this efficiency at various places where I am quite familiar with the improvements installed and also with the results therefrom; and I beg to advise that I have been well pleased with the results. And, good naturedly, I might say that it looks like treading on ones toes when accused in the public press of getting poor results, hence this reply. I have reasons to believe that Mr. Haas is mistaken, and if he is willing to take a definite stand and give a figure that will locate his "low," I will be pleased to show what I consider good.

CHAS. F. SHELBY.

Cananea, Mex., Jan. 12, 1910.

Patent versus Bone-Ash Cupels

In the abstract of the paper, "Comparison of the Thermal Properties of Cupels," by Bannister and Stanley, published in the JOURNAL of Dec. 11, 1909, there is one point not touched upon in the published abstract, and which is, possibly, the most important from the point of commercial results, and, therefore, of greatest moment to the assayer. I refer to their item (4), page 1167, "Cupellation losses are always lower on good patent than on bone-ash cupels."

It is a matter of experiment that the ordinary scorification and cupellation will show less silver than is actually present by 1 to 2 per cent., depending on the skill of the assayer, the weight of the button recovered and the elements present in the material to be assayed. The greater part of this silver difference can be recovered in the so-called "correction assay," i.e., by crushing the scorifier slag and the cupel bottom and assaying them.

When the weight of the silver thus recovered is added to that of the original assay button, the difference between the sum of their weights and the silver actually present is as a rule less than 0.2 per cent. the weight shown by the assays usually being less than the silver present. This small difference, however, is not the assayer's actual loss, which consists of the correction on the correction assay plus any volatilization losses, but is less than the actual loss of silver by about 0.3 to 0.4 per cent., which deficiency is compensated for by impurities in the silver beads recovered. These are mainly lead, bismuth and copper.

While it is thus demonstrable that the bone-ash cupel shows rather heavy losses originally, which are recoverable, in the main, by a correction assay, it is also equally demonstrable that care must be exercised with the patent cupel not to overrun the silver contents actually present. In certain experiments made on patent cupels with assays on known amounts of fine silver, from 98.55 to 100 per cent. of the silver actually present was recovered in the first assay button obtained, while after adding the correction buttons there was an apparent recovery of 100.8 per cent. of the silver actually present. This is doubtless due to the point upon which Bannister and Stanley lay so much stress, that the buttons both run and finish colder on the patent cupels than on the bone-ash. This colder finish evidently causes the retention of impurities in the silver bead.

It seems then that the assayer who is running corrected assays with patent cupels must either heat his cupels vigorously toward the end of the assay or run the risk of reporting more silver as present than actually exists.

DONALD M. LIDDELL.

Grasselli, Ind. Dec. 20, 1909.

The Ontario Bureau of Mines

In your issue of Jan. 15 there appears a letter from Thomas W. Gibson, deputy minister of mines for Ontario, stating that in a communication which appeared in the JOURNAL of Dec. 11, I made some reflections on the Ontario Department of Mines which were not warranted by the facts. If I remember rightly the extent of my offending was to suggest that the evidence adduced at a recent trial at North Bay called for an investigation into the affairs of the department. I remain of that opinion.

The source of my information was a report of the trial of an action brought by John Caley claiming a one-fifth interest in the Bartlett mine, which appeared in the Toronto *Globe* and several other Canadian journals. This report stated that Caley agreed to secure private information as to the location of the McIntosh and McLaughlin claims in the Gowganda district, and did so. In the final settlement, made out of court, Caley received $1600 cash and 5000 shares of stock for his claim.

The report of the trial obtained widespread circulation in Ontario. It was made the subject of editorial comments considerably more severe than anything contained in my letter at the time. Yet no official or semi-official contradiction of the statements of the report was published until the appearance of Mr. Gibson's letter in the JOURNAL. It seems rather singular that the department should allow such charges to go uncontradicted at home, and only attempt to meet them when they are published at a distance.

In conclusion I wish to say that I intended no reflection in any way upon Mr. Gibson whose reputation as a conscientious and zealous official is well known.

PHILLIPS THOMPSON.

Toronto, Jan. 18, 1910.

[Mr. Gibson's letter in the JOURNAL of Jan. 15 was a clear and straightforward statement of the facts, and it does not appear that Caley could obtain any information from the department of mines which was not equally accessible to any inquirer. As to the settlement it is quite possible that in the absence of accurate maps Caley, being on or near the ground, may have been able to give some information of value as to the actual location of the claims. Our correspondent seems to have relied too much upon local newspaper reports, which in Cobalt and Gowganda matters are apt to be colored by the reporter's interest or inclination. As to his other criticisms, it may well be that Mr. Gibson did not think it worth while to contradict statements made locally where the facts are well known, but did believe it necessary to make some protest when they were published where they would reach many who were not familiar with the affair.—EDITOR.]

The Big Vein Copper Company

A newspaper report in connection with the investigation by the authorities of the transactions of the People's Mutual Life Association and League, involving Lieutenant Governor White, of New York, says:

"John Tevis, a promoter whose specialty is the purchase of life-insurance companies, seems by the expenditure of only $2350 to have rented from Moran & Co., of New York, 25,000 shares of the capital stock of the Big Vein Copper Company, which he claims to be worth upward of $150,000, and with this rented stock to have secured what he claims to have been a loan to him from the Farmers' Bank of Canada of $150,000, with which sum, after taking out $10,000 for personal use, he paid certain of his obligations and by a disbursement of $110,000 acquired control of the Fraternal Beneficial Society with liquid assets of practically $3,000,000."

According to the official report of transactions on the New York curb in 1909 there were sales of 202,220 shares of the Big Vein Copper Company, as high as $11, closing at $9⅛.

It is the common gossip that this stock was manipulated to its high price by more or less scandalous operations. The condition came to the attention of Mr. Mendels, the agent for the curb, in December and action was taken to cancel the listing of the stock. At the same time the transfer agents who were involved in the disqute and litigation over the selling and hypothecating of pooled stock withdrew.

Apparently some persons have lately conducted a profitable operation in securing loans on this stock from country banks and financial institutions, using as a basis for the valuation of the collateral the quotations established on the curb market.

The Big Vein Copper Company, with a capital stock of 1,000,000 shares of $10 each, has William H. Sterling as president, and Joseph B. Moran & Co., as fiscal agents. It owns property near Tucson, Ariz., and Sherman, Colo. Its prospectus is a glorious affair. The Big Vein mine—in Arizona—is represented as having a mineralized dike, 300 to 800 ft. wide. A shaft is to be sunk 600 ft. deep, crosscuts the full width of the vein are to be driven, also drifts on the vein; and it is estimated that by July 1, 1910, although only a fraction of the vein will be opened, there will be blocked out 10,000,000 tons, which at 2 per cent. copper and 13c. per lb. will be $50,000,000 gross.

As if this were not enough, the Big Vein Copper Company owns a majority of the stock of the Mexamerican Company, which owns the Black Wonder and West End mines, near Sherman, Colo. These mines are stated to have *inexhaustible* orebodies (in the opinion of able authorities), and to have ore to the value of $82,500,000, *net*, developed. Moreover, the belief is expressed that this estimate is "exceedingly conservative," and that an increase of 20 per cent. would not be unwarranted.

Now should not the Rothschilds, the Count of Monte Cristo, and the proprietors of the Calumet & Hecla mine be envious? Oh, shade of Baron Munchausen!

The matter of the Big Vein Copper Company and some similar occurrences led to the issuance of the following edict by the curb committee:

"In all cases where stock is pooled under special contract, loan or otherwise, the certificates thereof used under such agreements as above stated shall be issued in the name of a trustee or trustees only, the trust to specify the particular purpose for which said stock was issued. Under no circumstances can this stock be utilized for delivery, and must in every case be issued in the name of a trustee or trustees. Certificates other than the above shall be considered a delivery, unless lost or actually stolen, in which case the numbers and denominations of same shall be furnished to the agency at once, for the protection of all. This resolution is effective absolutely on and after this date, Jan. 21, 1910."

The gravity tram of the Boston Consolidated, at Bingham, Utah, is said to be the longest of its kind in this country.

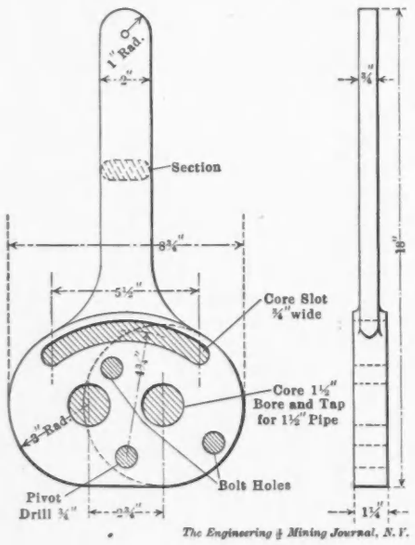
DETAILS OF PRACTICAL MINING

NOTES OF INTEREST TO OPERATORS OF SMALL AS WELL AS LARGE MINES ~ THINGS THAT HAVE TO BE DONE IN EVERY DAY MINING

Readers of the JOURNAL are invited to contribute to this department. Articles should be brief, thoroughly practical, and preferably illustrated by drawings or sketches. Our draftsmen will prepare properly any kind of a pencil sketch that is intelligible. Something that is an old story in one district may be quite unknown in another. Articles accepted and published are suitably paid for.

Cast Iron Spigot Holder for Settling Cone

To avoid the flooding usually experienced in changing spigots to cone settlers, W. O. Borcherdt, assistant superintendent for the Bertha Mineral Company, at Austinville, Va., devised the spigot holder shown in the acompanying drawing.

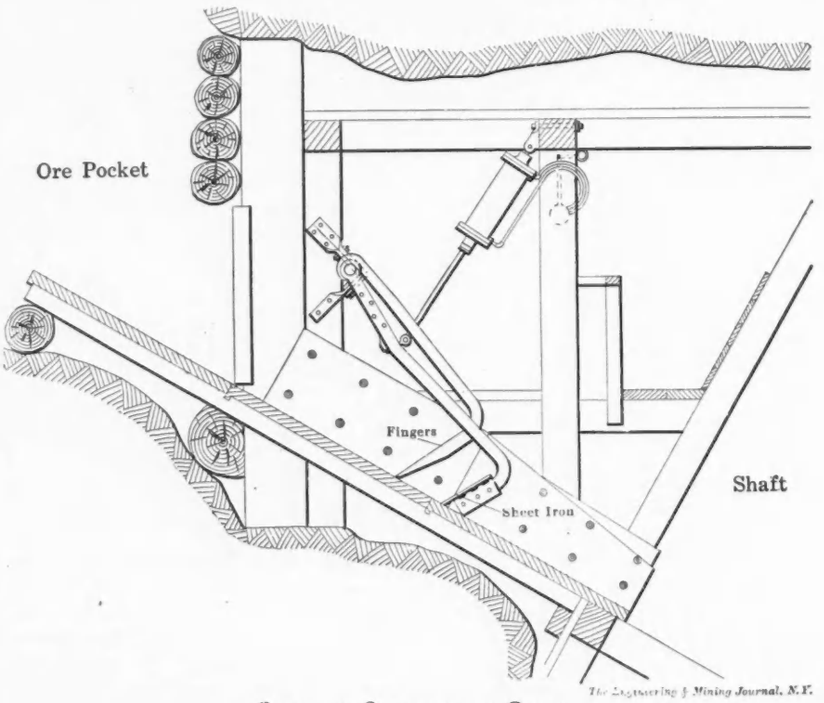


CAST-IRON SPIGOT HOLDER

The holder is pivoted at the ¾-in. drilled hole, and spigots are screwed into both the 1½-in. holes. In case it becomes necessary to change or renew a spigot the bolts can be loosened and the other spigot simply swung into position while a new one is being put into the holder. Thus, instead of exposing a much larger aperture and probably disarranging the working of the entire mill, a spigot of the proper size is always at hand if the one in use becomes clogged or requires attention for any cause.

Skip Loading Chute

The accompanying drawing shows an ore chute for loading skips used at the mines of the Granby Consolidated company, Phœnix, B. C. It is an improved form of finger chute, combining fingers with a sheet-iron gate for holding the fines. In the operation the sheet-iron gate



GATE FOR SKIP-LOADING CHUTE

is raised first by the air lift, then, as the arm is raised still higher by the piston of the air cylinder, the fingers are raised and the coarse ore allowed to escape. When the air is released the fingers fall first, catching the coarse rock, and there is a sufficient interval of time for the chute to clear itself before the sheet-iron gate is closed. The operation is rapid and the skips are filled nearly as fast as the skip loader can operate the valves.

A company to be known as the Rand Tailings Brick Company has been formed to make bricks from tailings. The capital will be £7000. On the flotation of the company machinery capable of turning out 12,000 bricks per day will be ordered. It is the intention later to establish works on the East and West Rand.

Notes on the Pohle Air Lift*

BY W. S. ANDERSON

The proportions of piping, submergence, etc., in the Pohle air lift may be arrived at mathematically, basing the calculations on the expansion of the air bubbles as they rise to the discharge where the head due to the sum of the water pistons above diminishes, and on the usual formulas covering capacities of air and water pipes; but for practical purposes in the case of small wells reliable results may be arrived at from the flollowing:

It is found in practice that the length of pipe submerged below the normal pumping level after the water has fallen should range from 30 to 60 per cent. of the total length of pipe from the bottom end to the top of discharge, the latter ratio of 60 per cent. generally giving the greatest efficiency. The air pressure should vary from three-quarters of the pressure due to the total lift for shallow wells to six-tenths for deep wells. It should be such that it will about equal atmospheric pressure at the point of dis-

*Reprinted from *Power*, December, 1909.

charge, unless high velocity is desired at the expense of economy. That is, it should equal the head in feet multiplied by 0.434 plus a few pounds for friction, this latter depending on the length of pipe and friction head. In this connection it should be remembered that where a central air pipe is used in drilled wells, on account of there not being room for the air pipe outside of the water pipe, the friction head is greater. If the compressor is close to the well, the reservoir should be proportioned to reduce all impulses, though in the case of a long air line this will to a great extent take care of itself.

In the case of a large well casing, where the inflow into the well is small, or where the desired amount of water is small in proportion to the capacity of the pipe, the air pipe, if central, should purposely be made large enough to prevent blowing, the most desirable proportion, as indicated by practice, being about 1:2 for small wells and 1:3 where the diameter of water pipe is over 2½ in.; or the area of the water pipe is about six times the area of the air pipe for average cases. If the air is taken from shop air mains, where variable service causes a large variation in air pressure, and the air is not run through a reducing valve, the sudden expansion of high-pressure air at the discharge is likely to cause trouble, if the discharge is into a covered or practically closed tank. This may be relieved by putting a large-sized safety valve at any convenient bend.

Assuming 60 per cent. submergence, the volume of free air for maximum economy may be roughly taken from the following: For lifts of 25 ft., 13 cu.ft. of air for 100 gal. of water; for lifts of 75 ft., 28 cu.ft. of air per 100 gal. of water; for lifts of 100 ft., 36 cu.ft. of air per 100 gal. of water; for lifts of 150 ft., 57 cu.ft. of air per 100 gal. of water; for lifts of 200 ft., 75 cu.ft. of air per 100 gal. of water.

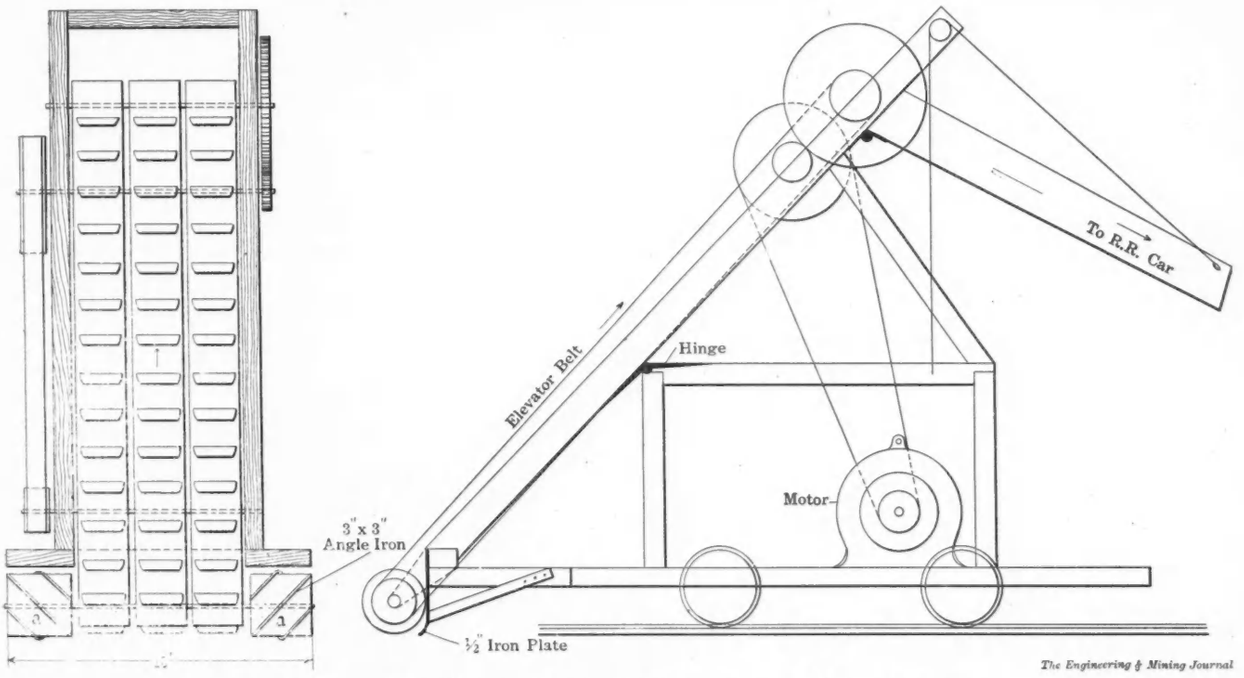
With side inlets and ¾-in. air pipes and 1½-in. water pipe, the ordinary capacity will be about 25 gal. per min., and for larger wells the capacity may be assumed as varying nearly but not quite with the square of the diameter of the water pipe. For example, a 6-in. water pipe will ordinarily give a flow at fair economy of from 400 to 425 gal. per min. In the case of central air pipe with 3½-in. casing, the output should be about 110 gal. per min., or 230 gal. with 5-in. pipe, and other sizes in proportion. Generally speaking, from 10 to 14 gal. per sq.in. of area of water pipe, after deducting the air-pipe area, will be about right, the smaller figure being used for short lifts and the larger figure for lifts of 100 ft. or over.

The matter of economy is generally misunderstood and most of the claims of high efficiency should be taken with rather a liberal allowance. While under favorable conditions it may be possible to approach 70 or 80 per cent. efficiency figured from the discharge back to the indicated horse-power of the compressor, most of the tests of ordinary wells where extreme submergence is not possible seem to indicate efficiencies between 20 and 35 per cent. It should also be understood and remembered that the air lift is not well adapted to forcing water horizontally, and horizontal discharges of over 40 or 50 ft. should be avoided, except by discharging into a tank with a gravity flow the rest of the distance.

Chat Elevator and Loader

A large amount of chats (tailings) in the Joplin district are sold to the railroad companies for ballast. The handling of a large tonnage of this material has evolved the construction of an elevator for loading railroad cars. The elevator is run by a 35-h.p. motor which takes its power from the trolley system. The elevator consists of three belt elevators, inclined at an angle of 45 deg. and having 14-in. buckets. These three elevator belts are operated on three sets of belt pulleys, attached to the same shaft. The accompanying drawing shows the general arrangement of the elevator. The entire outfit is mounted on two pairs of car wheels with 6-ft. wheel base. The lower shaft to which the pulleys are attached is 10 ft. long. At each end is a wheel *a*, 24x30 in. which was originally a belt pulley. To the rim of this wheel is bolted a curved piece of 3x3-in. angle iron, which forms a spiral, one wheel being right and the other left. These wheels assist in feeding the bucket elevator by throwing the chats to the center. As the material is elevated it falls into a chute, which in turn conveys it to the car.

The apparatus is operated on a standard-gage track. Short rails are placed in front of the machine when it is necessary to move the machine forward. This part of the work is the same as for steam shovels. The loader is moved forward or backward by means of the motor car that does the switching of the cars. Two men are employed to assist in feeding the elevator, and one man operates the motor. The elevator belt is 25 ft. long, center to center of pulley. Thirty buckets are at-



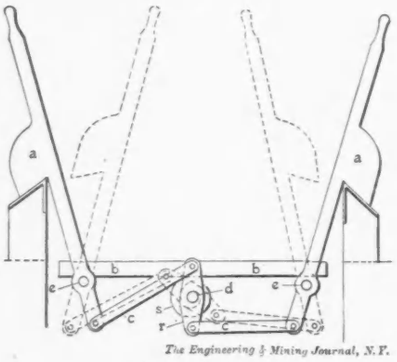
FRONT AND SIDE VIEW OF TAILINGS ELEVATOR IN THE JOPLIN DISTRICT

tached to each belt. It requires 5 minutes to load a 15-cu.yd. car. The loader used by the railroad company is constructed in such a way that the elevator portion may be lowered in order to transfer it where trolley wires would interfere. The hinged joint is shown in the illustration.

A similar but smaller machine is being used at the Yellow Dog mine for handling tailings that are being retreated. The loader at the Yellow Dog mine has a friction clutch which operates a chain belt connected to the wheels, so that it can be moved forward or backward by its own motive power as in the case of the steam shovel. There is also a double winding drum, which operates a car with a tailrope system. The car has a capacity of 2⅓ tons, and the haul is 250 ft. Forty trips per hour can be made; the car is self-dumping, and while the car is making its trip to the bin, a hopper is being filled by the elevator so that no time is lost in loading. Three men operate this machine. A 20-h.p. motor is used.

Chairs on the Cage

In the effort to do away with the chairs in a shaft, many devices have been tried. An apparatus similar to the one described here can be made in any mine shop and will give perfect satisfaction.



The Engineering & Mining Journal, N.Y.

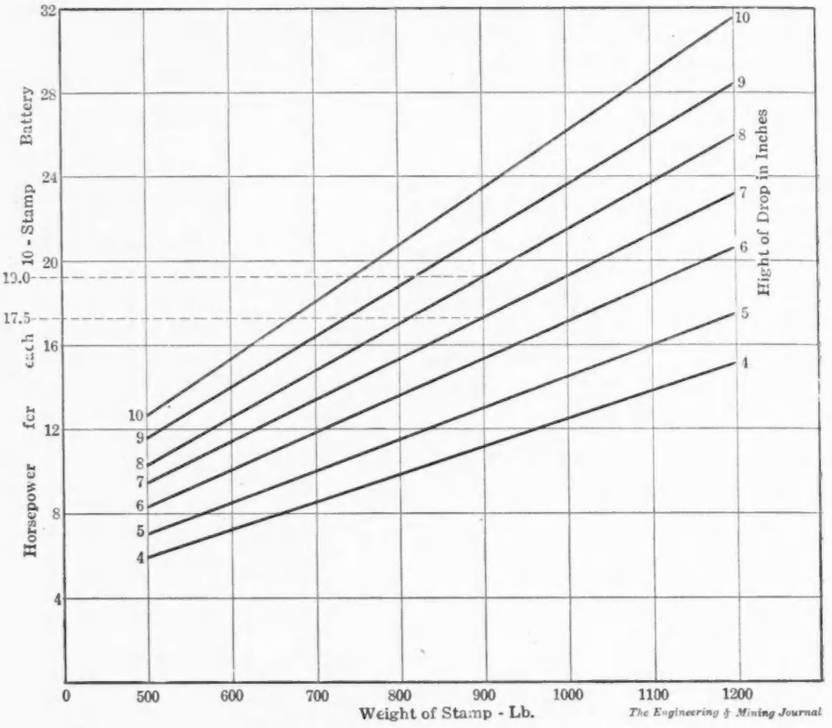
CAGE CHAIRS

In the accompanying sketch the levers *a a* carrying the chairs are four in number and are set at each corner of the cage floor *b b*, just within the side rods. As shown, they are connected by the rods *c c* to rocker arm *r*, and are held clear of the shaft when the cage is in motion by the powerful spring *s*. The shaft *d* and bars *e e* extend across the cage and the arrangement is duplicated on the other side. Thus a movement of any lever actuates all.

The chairs rest on blocks with sheet-iron caps placed at each corner of the shaft compartment. The hight of these blocks is, of course, such as will insure alinement of the cage rails with those on the station. The mechanism can be operated from the cage or station floor.

Power Required for Stamp Batteries

The power necessary to drive stamp mills in units of 10 stamps is readily obtained from the accompanying diagram prepared (*Aust. Min. and Eng. Rev.*, Oct. 5, 1909) from the notes of E. H. W. Westwood, of Melbourne. The chart is figured on a basis of 90 drops per minute. The following example explains the method of using the diagram: Required: The horsepower necessary to drive a 10-head battery of 900-lb. stamps, 90 drops per min., hight of drop being



HORSEPOWER DIAGRAM FOR STAMP BATTERIES (INCLUDES ALL FRICTION)

7 in. Take the figure 900 under the "weight of stamps," follow this line vertically until it intersects the 7-in. drop line, then proceed horizontally to the left of the diagram, where it will be found that the required power for each 10-stamp battery is 17.5 h.p. Another use of the diagram is in finding the change in horsepower, by varying the hight of drop without changing the weight of stamp; for example, with a 900-lb. stamp, in changing the drop from 7 to 8 in., the increase in horsepower for each 10-stamp battery is from 17.5 to 19 horsepower.

A new form of license to be issued to oil prospectors in the island of Trinidad has been prepared. A recent consular report states that an essential condition of any concession will be that 'the receiver thereof shall be and remain a British registered company, and be prohibited from transferring rights to any other than a British registered company." When oil is found, the prospect or well must be worked; it can not be locked up and left idle or undeveloped.

Cyanide Tank Record

The accompanying form of tank card is in use at the cyanide plant of the El Tajo Mining Company, at San Sebastian, Jalisco, Mex. One of these cards is hung at each tank, thus enabling the operator to see at a glance the amount of treatment each tank has had. After a tank is discharged the card is taken to the office, and there filed for use in working up data sheets.

TANK RECORD BLANK.

EL TAJO MINING COMPANY

Slime Tank No..... Charge No.....

Charging.....M .....19..

Slime .....inches Sp. Gr.....Tons.....

	Inches Decanted	Net Hours Agitation
1st Agitation.....to..		
Settling and Decanting		
2nd Agitation.....to..		
Settling and Decanting		
3rd Agitation.....to..		
Settling and Decanting		
4th Agitation.....to..		
Settling and Decanting		
Cubic Feet Pulp		
Per Cent. H_2O		
Tons Dry Slime		
Agitation and Discharging to Burt Filter		
from.....to..		
Sodium Cyanide...kg.		
Lead Acetate.....“		
Lime.....“		

Gold and Silver Production of the United States

Dr. A. Platt Andrew, director of the Mint, has completed his preliminary estimate of the production of gold and silver by the mines of the United States for the calendar year 1909. The estimate is based upon deposits at the mints and assay offices of the United States and reports received from private refineries and smelters in the United States.

The totals of this estimate for 1909 compare with the corrected figures for 1908 as follows:

	1908.	1909.
Gold, fine ounces	4,574,340	4,800,359
Value	$94,560,000	$99,232,200
Silver, fine ounces	52,440,800	53,849,000
Commercial value	$28,050,000	$28,010,000

The increase in gold in 1909 was $4,672,200, or 4.9 per cent. The increase in quantity of silver was 1,408,200 oz., or 2.7 per cent. Owing to the lower average prices of the year, however, there was a decrease of $39,900, or 0.14 per cent., in the commercial value.

I. GOLD PRODUCTION OF THE UNITED STATES.

IN DOLLARS.

	1908.	1909.	Changes.
Ala	$41,200	$28,000	D. $13,200
Alas	19,858,800	20,947,600	I. 1,088,800
Ariz	2,500,000	2,672,300	I. 172,300
Cal	19,329,700	21,271,300	I. 1,941,600
Colo	22,871,000	21,954,700	I. 83,700
Ga	56,200	44,300	D. 11,900
Idaho	1,443,500	1,389,300	D. 54,200
Illinois	.....	300	I. 300
Mo	.....	200	I. 200
Mont	3,160,000	3,599,400	I. 439,400
Nev	11,689,400	14,908,400	I. 3,219,000
N. M	306,300	278,300	D. 28,000
N. Car	97,500	32,200	D. 65,300
Ore	905,900	712,900	D. 193,000
S. C	53,700	3,500	D. 50,200
S. D	7,742,200	6,849,900	D. 892,300
Tenn	3,700	3,700	.....
Tex	500	400	D. 100
Utah	3,946,700	3,844,800	D. 101,900
Va	3,600	3,600	.....
Wash	253,700	377,900	I. 124,200
Wyo	7,600	3,800	D. 3,800
Other States	3,700	118,700	I. 115,000
Total U.S.	$94,274,900	$99,045,900	I. $4,770,600
Porto Rico	600	600	.....
Philippines	284,500	186,100	D. 98,400
	$94,560,000	$99,232,200	I. $4,672,200

GOLD PRODUCTION

In the first of the accompanying tables the gold production by States is given, the figures being in dollars. The gain in the total was larger than was indicated by the earlier partial estimates, this being due to the heavy increase in Nevada, and to the unexpectedly large gain from California. In Alaska the increase was about what had been expected. There were four States which reported over $10,000,000 each in 1909. Of these Colorado alone showed a decrease, but still remained the leading producer. California, however, came near claiming the first rank owing to a gain of more than 10 per cent., a large part of which was due to the dredge operations, which have become such a prominent part of the mining industry in that State. Alaska was third in rank, coming very close to California. Nevada showed a heavy gain, due to the more thorough working of its mines and the extension of mill operations rather than to new discoveries. These four producers furnished altogether $79,081,000, or 79.7 per cent. of the total.

There were five producers of the second rank, which reported last year an aggregate of $18,355,700, or 18.5 per cent. of the total. These, in the order of their importance, were South Dakota, Utah, Montana, Arizona and Idaho. Of these Montana and Arizona had increases, while South Dakota reports a considerable loss, due chiefly to labor troubles at the great Homestake mines.

II. SILVER PRODUCTION IN THE UNITED STATES.

IN FINE OUNCES.

	1908.	1909.	Changes.
Ala	400	200	D. 200
Alas	204,600	158,100	D. 46,500
Ariz	2,900,000	3,632,200	I. 732,200
Cal	1,703,700	1,705,200	I. 1,500
Colo	10,150,200	9,093,600	D. 1,056,60
Ga	200	200	.....
Iad	7,558,300	7,054,500	D. 503,800
Ill	2,000	3,600	I. 1,600
Mich	294,100	323,900	I. 29,800
Mo	49,400	15,200	D. 0 34,200
Mont	10,356,200	12,000,000	I. 1,643,800
Nev	9,508,500	8,953,000	D. 555,500
N. M	400,900	329,200	D. 71,700
N. C	1,300	500	D. 800
Ore	56,100	71,100	I. 15,000
S. C	200	200	.....
S. D	197,300	205,600	I. 8,300
Tenn	60,900	58,500	D. 2,400
Tex	447,000	358,300	D. 88,700
Utah	8,451,300	9,533,400	I. 1,082,100
Va	300	6,000	I. 5,700
Wash	86,800	73,500	D. 13,300
Wyom	3,500	1,100	D. 2,400
Other states	6,300	269,800	I. 263,500
Total U.S.	52,439,500	53,846,900	I. 1,407,400
Phiilppines	1,300	2,100	I. 800
Total	52,440,800	73,849,000	I. 1,408,200

No other State produced as much as $1,000,000 in 1909, and only one—Oregon—over $500,000. The aggregate for the 13 lesser States in the table was only 1.8 per cent. of the total. The Philippines report a decrease, there having been more prospecting than actual working in the islands during the year.

SILVER PRODUCTION

The second table shows the silver production by States. Montana again held the first position; Utah took the second, Colorado dropping to third place. The other large producers in order were Nevada, Idaho, Arizona and California. No other States reported as much as 500,000 oz. Of the seven large producers Montana, Utah and Arizona reported large gains and California a small one. Colorado, Nevada and Idaho showed decreases of considerable proportion. The important increases were all in States having large copper production. In Idaho the silver is won chiefly in connection with lead; in California with gold, and to a smaller extent with copper. The comparatively large quantity credited to other States is probably silver reported by smelters, which could not be properly apportioned in the preliminary estimate.

Receipts of Gold at Seattle

The annual report of Calvin E. Vilas, assayer-in-charge, shows that the United States assay office in Seattle received 24.4 tons of gold valued at $12,864,268 during the calendar year of 1909. The total receipts of the Seattle office since the opening on July 15, 1898, to the close of 1909, amount to 376.2 tons, valued at $188,128,872. The receipts of gold for the year 1908 were $18,064,171. The gold for 1909 was sent from the following points:

Nome	$4,239,416
Tanana	6,204,573
Balance for Alaska	863,592
Total for Alaska	$11,307,581
British Columbia, Canada	$1,319,237
Yukon Territory, Canada	161,771
All other sources	75,679
Total	$12,864,268

The foregoing is not the total output of the districts mentioned, as a portion is shipped each year to the United States mints and other United States assay offices. Of the $188,128,872 which has been received at the Seattle office since July 15, 1898, Nome has furnished $42,264,228; Tanana has furnished $37,329,157, and the remainder of Alaska $7,865,248, making the total of $87,458,633 for all Alaska.

Zinc Production of the World

A circular just issued by Henry R. Merton & Co., of London, gives their usual yearly estimate of the zinc production of the world. This estimate is generally very close to the actual output shown later by the official reports. The figures are given in the accompanying table, and are in long tons of 2240 lb. For the United States we have substituted the statements given in THE MINERAL INDUSTRY for 1908, and in the JOURNAL of Jan. 8 for 1909, for those of Merton & Co., but the difference is small.

ZINC PRODUCTION OF THE WORLD.

	1908.	1909.	Changes.
Belgium	162,420	164,470	I. 2,050
Rhine district	72,050	73,990	I. 1,940
Holland	16,985	19,240	I. 2,255
Great Britain	53,615	58,415	I. 4,800
France and Spain	54,940	55,235	I. 295
Silesia	141,410	142,625	I. 1,215
Austria and Italy	12,560	12,440	D. 120
Poland	8,700	9,000	I. 300
Total Europe	522,680	535,415	I. 12,735
Australia	1,070	.....	D. 1,070
United States	187,956	238,455	I. 50,499
Total	711,706	773,870	I. 62,164

The total increase in 1909 was 8.7 per cent. Of this four-fifths came from the United States. All the European countries except Austria increased their production, but the gains were small in most cases, only Great Britain and Holland having any considerable changes.

The Bureau of Mines bill passed the House on Jan. 25.

The Guggenheim Coppers

The litigation between Col. E. A. Wall and the Utah Copper Company has brought out some interesting information respecting the ownership of the Guggenheim coppers.

Daniel Guggenheim in an affidavit said that he and his brothers own 437,011 shares of the Guggenheim Exploration Company. The Exploration company owns 232,805 shares of Utah Copper Company. Further than this, the only Guggenheim ownership of Utah Copper Company is 900 shares held by Solomon R. Guggenheim.

The Guggenheim Exploration Company owns 379,416 shares of Nevada Consolidated. In addition Daniel owns 52,067; Morris, 58,558; Solomon, 64,500 and Isaac, 2400, making the total holdings of the brothers, 199,125.

No stock of Nevada Consolidated was ever owned by the American Smelters' Securities Company. The American Smelting and Refining Company is not owned or controlled by M. Guggenheim's Sons, but has 10,000 shareholders, and widely distributed stock.

Charles M. McNeill, president of the Utah Copper Company, said in an affidavit that the directors of that company own 127,000 shares of its capital stock. The directors include Mr. McNeill, D. C. Jackling, R. A. F. Penrose, Jr., John Hays Hammond, J. D. Hawkins, Charles Hayden, William B. Thompson, S. W. Eccles and K. K. McLaren. There are 1500 shareholders in the Utah Copper Company, the stock owned and represented by members of the board other than Mr. Eccles and the Guggenheim interests exceeding 240,000 shares. The Guggenheims have never participated actively in the management of the company, or attempted to guide its policy.

Mr. McNeill in his affidavit explained the mutual benefit which the directors claim will result from consolidation of the Utah and Boston companies. Unless the consolidation be made, said Mr. McNeill, the present steam-shovel method of mining cannot be continued, and the Utah company will be compelled to resort to a more expensive scheme of underground mining.

S. J. Jennings, consulting engineer, made affidavit that without consolidation, the Utah company can continue to produce 62,000,000 lb. of copper per year at cost of 9c. per lb., yielding $3.92 per share with copper at 13c. With an enlarged company it can produce copper at 8½ cents.

On Jan. 25, the injunction was dissolved and the merger of the Utah Copper and Boston Consolidated companies was consummated before the close of the day on the basis of 2½ shares of the latter for one share of Utah Copper.

Stratton's Independence

The first report of the directors of Stratton's Independence, Ltd., since the reconstruction, has been issued. For the period Sept. 8, 1908, to June 30, 1909, the total amount of shipping ore obtained from the mine near Victor, Colo., was 21,162 tons, which realized £108,035. A large proportion of this ore was won by lessees who pay a graded royalty and a percentage of the profits to the company. The amount netted by the company from royalties and percentages of profit was £32,360, or an average of 35.958 per cent. The company's wet mill was operated with a profit of £1036. The net profit carried to the balance sheet was £7843, out of which the directors recommend the payment of a dividend of 5 per cent. on the present capitalization of 1,000,000 shares at 2s. 6d. per share. An interim dividend of like amount is also to be paid out of the profits earned during the last six months.

Philip Argall, the consulting engineer, reports that the new leasing system inaugurated has proved quite satisfactory in operation and that it is largely due to this system that the increased returns from lower grade ore and the large amount of development work have been obtained.

Milling Operations

As regards the dry mill which was designed to treat concentrates from the dump or wet mill and general mine ore, operations were started in January, but as sufficient ore could not be obtained the mill was shut down in March. The plant has a capacity of 80 to 100 tons per day, but only 30 to 35 tons could be obtained.

The production of high-grade ores was not nearly sufficient to warrant milling on the spot; furthermore, the reduction in the treatment cost by Cripple Creek custom mills between the time mill construction commenced and January last, did not justify milling the high-grade ores, said reduction varying from $1.25 per ton on ores under $10, to $2.50 per ton on ores exceeding $60 per ton in value. This cut in rates continues in force today. Should the old rates be again enforced the high-grade ores could be treated in the company's dry mill. Development in the mine is now proceeding so as to obtain an ore supply for treatment in the dry mill without roasting and therefore at a much less cost per ton treated, once the continuous-roasting process is eliminated.

The wet mill has been operated at a profit. Mr. Argall states that since the mill started last April the working profits have averaged $10,000 per month and that he hopes to maintain that average.

Erick Johnson, the mine superintendent, says in his report: "I could not venture a guess on the ultimate production of the Independence; the conditions are unique; we have been quite successful in reworking the caved ground, though we seldom had over a week's ore supply in sight at any one time.

"The mine, however, is in better condition today, looks better, and has more ore exposed than at any time since November, 1908. Therefore, I believe we will at least do as well in the way of output as we did during the previous year."

The Hocking Scandal

The *Wall Street Journal* says: Defenders of speculation in Columbus & Hocking Coal and Iron have failed to offer any excuse which does not amount to what the lawyers call a plea of confession and avoidance. The objectionable character of the speculation is admitted, but it is contended that it is in some way excused by some prospective value in the property which will ultimately justify the price at which it was selling.

This plea makes the whole matter only more suspicious. Here is the stock of a land company which has been through one bankruptcy, which has never paid any dividend, and has been kicking about the floor for over a quarter of a century, which is suddenly found to have great prospective value. This is conceivable, but when the discovery of oil, natural gas, brick-making clay and pitchblende is coincident with an advance of the stock by an expert manipulator, the intelligent investor will be hard to convince.

If stories of the increase in value contained any truth, it would have been to the interest of those who control the property to have kept the price as low as possible for as long as possible. There would have been no necessity for paying Mr. Keene a large sum to manipulate an advance in the stock.

Some investigation was made by the Stock Exchange last year, with the result that the pool seems to have been given a clean bill of health. The governing committee consists far too largely of the floor-trading and specialist element, with utterly inadequate representation of the commission houses who bring the legitimate business into the market. Plenty of floor specialists even now see nothing to excite public criticism in the movement of the stock. That element does not believe in reforming the methods of the Exchange, and may be said to have been responsible for the utter failure to act upon the recommendations of the Hughes commission.

It is simply a question of whether the Stock Exchange will deal with its members before and not after the offense. That is the only alternative to direct interference from Albany, the ultimate cost of which no man can estimate.

Recent Developments on Iron Hill, Leadville

Evidence that Ascending Solutions Permeating Cambrian Quartzite Played Important Part in Formation of Ore in Silurian Limestone

BY GEORGE O. ARGALL*

Iron hill, situated about two miles east of the city of Leadville, was the scene of great mining activity in the early history of the camp. The most extensive lead-carbonate ore deposits of the entire district were mined here. It is still a region of great interest, as the mining operations conducted during the last few years are of particular economic importance in that they have served to prove the existence of extensive sulphide orebodies in the Silurian limestone, and the presence of ore-bearing fissures and bedded deposits in the Cambrian quartzite. Mining developments having thus penetrated the lower sedimentaries have established the fact that the important oreshoots are not so strictly confined to the upper beds of the Carboniferous limestone as was originally supposed.

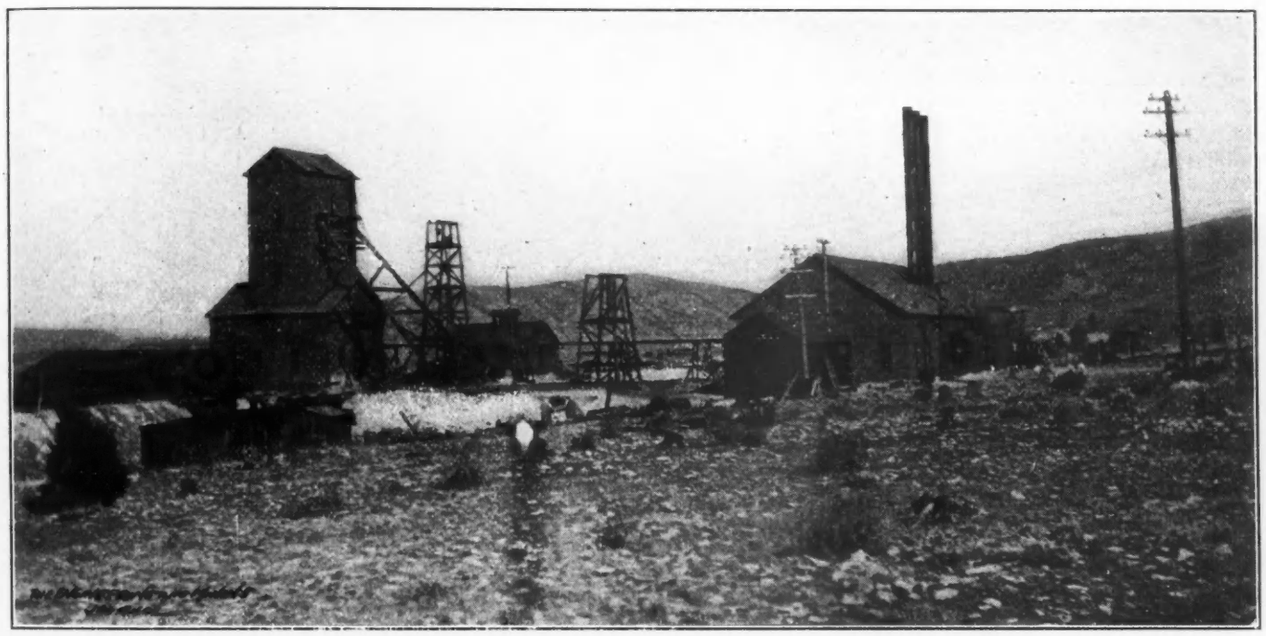


FIG. 1. TUCSON SHAFT OF THE IRON SILVER MINING COMPANY, LEADVILLE

General Geology

S. F. Emmons in his excellent monograph on the "Geology and Mining Industry of Leadville," so accurately defined the geological structure of Iron hill, that after more than 23 years of development it stands the test in general and has proved of the highest possible utility to those engaged in mining in this district.

The general geological conditions of Iron hill, as first determined by Mr. Emmons, may be briefly summarized as follows: Commencing with the fundamental Archean granite, of unknown thickness, there rests directly upon it the Cambrian quartzite, showing an average thickness of 125 ft. Next in ascending order occurs 160 ft. of Silurian white limestone separated from the overlying Carboniferous blue limestone by a persistent stratum of quartzite from 15 to 20 ft. thick, known as the parting quartzite. The blue limestone has an average thickness of 200 ft. and has been the most prolific ore-bearing formation of the Leadville district. Immediately overlying the blue limestone is the white porphyry, of varying thickness up to 600 ft., capping the ore measures and forming the summit of Iron hill. Cutting through the sedimentaries in the form of dikes and spreading out along contact planes or between the bedding planes of the limestone, in sheets of varying thickness, are found the eruptive quartz-monzonite porphyries, locally termed gray porphyry, in the vicinity of which the most important orebodies are often found.

History

During the earlier years of lode mining in the Leadville district, from 1877 to 1890, Iron hill was a constant and heavy producer of carbonate ores. The ore occurred in extensive irregular shoots along the contact plane between the white porphyry and blue limestone, at various points pitching down into the body of the limestone to varying depths forming channels, which gradually pinched out in depth, or, as in some cases, spreading out into extensive bodies at a lower horizon. These deposits were found almost entirely within the oxidized zone and consisted mainly of argentiferous lead carbonate together with occasional unaltered nodules of galena, the gangue being composed of hydrated oxides of iron and manganese, with silica and clay. At times this gangue was so enriched by silver minerals as to form a valuable product. Sometimes the richest ores were of this nature and contained large amounts of silver chloride and native silver, particularly in depressions in the limestone, the "pot-holes" of the miners. The oreshoots outcropping on the western slope of Iron hill followed the limestone on its easterly dip at an angle of about 12 deg., the strike being north 40 deg. east. The underground workings of the Iron Silver Mining Company, known as the Iron mine, were the most extensive of any in the district during this period. This company opened its property and extracted its ores through inclined shafts, which, following the ore on its dip, developed shoots exceeding 1500 ft. in

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length. Subsequently the Tucson shaft, situated at the summit of Iron hill 1200 ft. east of the outcrop, cut the blue limestone at a depth of 350 ft. below the surface. The workings from this shaft developed some isolated bodies of carbonate ores on the first contact; these were soon worked out and as the known oreshoots in the carbonate horizon of the iron mine proper were practically exhausted, the company discontinued operations in 1889 and placed the mine on a leasing basis.

Recent Developments

In 1903, the Iron Silver Mining Company decided to put down a series of diamond-drill holes from the carbonate workings of the Tucson mine in order to test the lower horizons, which it was thought might prove to be ore bearing. The result of this work disclosed the existence of bodies of mixed sulphide ores in the Silurian limestone, showing an average thickness of 30 ft. At a depth of 880 ft. below the surface, ore was cut in four drill holes separated by wide intervals. It is interesting to note that the samples taken from borings, while the drill was passing through the ore, gave low assay returns, in fact, none of the samples represented pay ore. Inasmuch as the holes before cutting the ore had passed through soft ground, which had given considerable trouble by caving around the rods, it was assumed that the samples had become vitiated by small particles of waste rock washed up from the sides of the hole, together with the cuttings from the bottom. Such subsequently proved correct, as the company decided it was warranted in further exploiting orebodies of the magnitude disclosed by the drill holes; consequently the old Tucson shaft, a two-compartment one reaching a total depth of 600 ft. from surface, was enlarged to a three-compartment shaft; a modern mine plant erected at the collar and sinking continued to a depth of 1060 ft., at which point the shaft had penetrated 50 ft. into the Cambrian quartzite. At a depth of 850 ft. from surface the shaft passed into pay ore and continued therein for a distance of 55 ft. As the ore pitched rapidly to the east, the shaft was carried down 100 ft. below the ore before stations were cut and levels extended to develop the pay shoot.

Faults

Iron hill is bounded on the western side by the Iron fault, striking a little east of north and having an average dip of 50 deg. to the west. This is a normal step fault with a downthrow of 800 ft. to the west, or hanging-wall side. The eastern slope of the hill is limited by the Mike fault which is likewise normal, with the upthrow to the east. Within the area between the Mike and Iron faults the deep workings from the Tucson shaft have recently disclosed a well defined fault which strikes north 40 deg. west, and at the lowest point developed has a dip of 45 deg. to the east. As it passes up through the formations, it rapidly flattens out to the westward and finally dissipates itself in the bedding planes of the upper sedimentaries. The eastern or hanging-wall side, has been thrust up along the fault a distance of 360 ft., equivalent to a vertical displacement of 200 ft. This fault is now known as the Tucson (Figs. 2 and 4), and is of particular importance as it cuts through the longitudinal axis of the main oreshoot displacing the eastern edge of the orebody. The further relation of this fault to the ore deposits will be described later.

Porphyry Dikes and Contiguous Ore Deposits

Numerous dikes and sheets of a coarse-grained quartz-monzonite porphyry are found cutting through or spreading out into the sedimentary formations of Iron hill. The porphyry was formed at great depth and has been intruded into the sedimentaries under intense pressure, though these igneous masses have not succeeded anywhere in breaking through to the surface of the hill. The porphyry is a greenish gray and is commonly referred to throughout the district as gray porphyry. The dikes vary greatly in width, showing a minimum of 18 in. and a maximum width of 260 ft. as penetrated by the mine workings. They usually continue in comparatively straight directions but in a few cases sharp angular bends have been noted. As a general rule the dikes cut sharply through the sedimentary strata. Instances are seen where the strata have been strongly tilted up along the edge of the intrusion, and in some cases the adjacent limestone shows the effect of shearing strains. The gray porphyry masses have undoubtedly been intruded previous to the formation of the ore, and in most cases before the movement which produced the faults.

Some important orebodies have been formed along the contact of these dikes with the limestone, the ore having been deposited in the limestone by a process

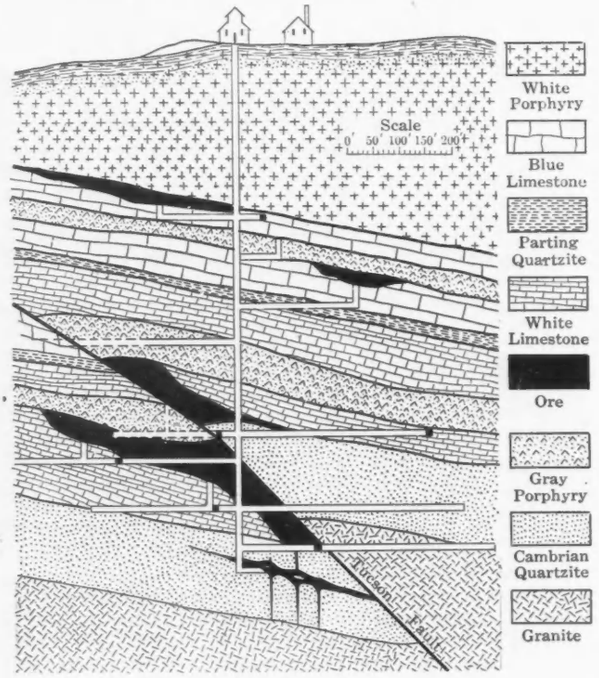

Fig. 2. Section Through Tucson Shaft

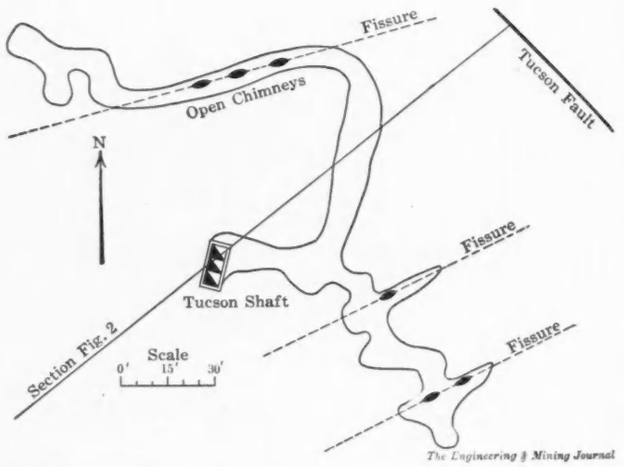

Fig. 3. Oreshoot and Fissures in Cambrian Quartzite

of replacement. The ore does not extend into the mass of porphyry. The close association of the gray porphyry intrusions with certain ore deposits points to the evident conclusion that they were an important factor in determining the position of these orebodies. It may even be assumed that these intrusions have established channels by means of which the ore-bearing solutions gained access to the limestone. The porphyry masses were intruded into the sedimentary strata in a state of hydrothermal fusion, and in cooling it may be assumed the porphyry contracted and shrank away from the inclosing rock, leaving more or less open spaces now represented by decomposed porphyry in and adjacent to the upper limestone deposits. In the lower beds of the white limestone, a thin but very persistent vein-like streak of sulphides on the dike wall connects, in many cases, with large overlying orebodies (Fig. 6). Thus it would appear that ore-bearing solutions from some deep-seated source entered the shrinkage spaces along the sides of the porphyry dikes, and ascending along them finally reached the limestone in which they deposited their burdens.

The large deposits are sometimes contained in the limestone in localities where it was sheared and shattered by a porphyry intrusion affording cracks and joints through which the solutions were able to percolate and react on the limestone. Frequently the orebodies are immediately under a porphyry sheet or offshoot forced out along a bedding plane in the limestone from some neighboring eruptive dike. Solutions ascending along the dike would be halted by the comparatively impervious barrier presented by these sheets, and forced to spread out laterally in the opened bedding planes and might readily deposit their mineral contents in the underlying limestone. Fig. 6 shows in cross section a contact deposit disclosed in the mine workings of the Tucson shaft. The ore on the dike is a massive, dense, exceedingly fine-grained sphalerite with a steel-like fracture. It is evident from the thickness of the ore that many of the planes in the thin-bedded Silurian limestone are entirely obliterated while those that do exist are much altered. This dike deposit has sharp-cut boundaries in the limestone, the ore ending almost as abruptly as if it had filled an open cavity. This orebody differs so much from the main oreshoot in the Silurian limestone (hereinafter described) as almost to suggest a different paragenesis. Both deposits occur in the same thin-bedded limestone formation, the only other apparent physical difference being that adjoining the dike deposit the limestone is metamorphosed and in part strongly marbleized, indicating a possible hydatogenic origin for this particular deposit.

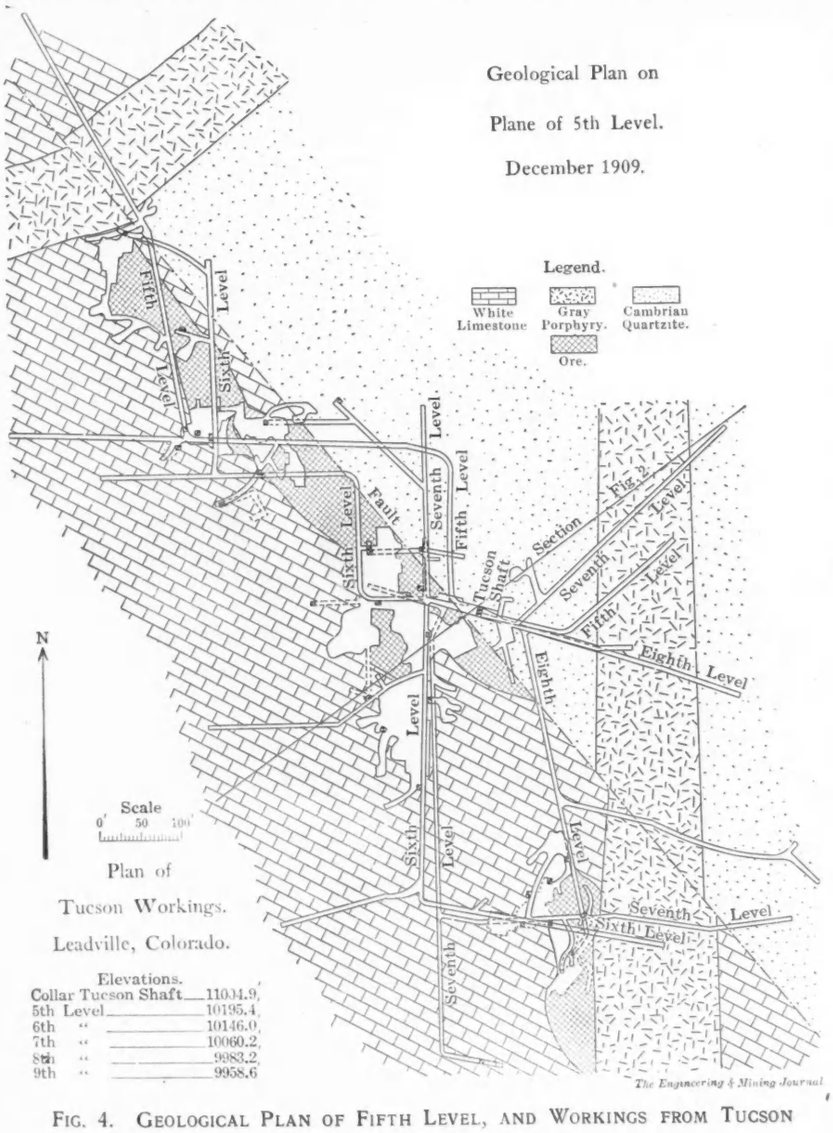

FIG. 4. GEOLOGICAL PLAN OF FIFTH LEVEL, AND WORKINGS FROM TUCSON SHAFT

ORE DEPOSITS

The ore deposits contained in the lower sedimentaries may be classified into two groups according to their mode of occurrence: Those which have been deposited as incrustations lining preëxisting cavities and fissures in the Cambrian quartzite, and those which occur as replacement deposits in the Silurian limestone. The largest orebodies, and so far the most important commercially, belong to the second class. The deposits of the first class are of great geological interest since they are found directly beneath the replacement orebodies with which they are apparently connected by means of chimneys or pipes.

ORE-BEARING FISSURES IN QUARTZITE

The Cambrian quartzite in the vicinity of the Tucson shaft is shattered by a series of vertical fractures striking approximately northeast and southwest (Fig. 3). Along these fractures occur open cavities of varying dimensions from oval-shaped conduits a few inches wide to channels 10 ft. wide and 4 ft. high along the strike of the quartzite beds. Incrustations of ore, from a few inches up to 2 ft. in thickness completely line these openings, but where the large cavities occur, the roof ore is often found on the floor with fragments of the quartzite roof caved down upon it, see Fig. 8. This occurs on account of the inclosing quartzite being in part disintegrated through the removal of the cementing material, leaving a loose sand-like rock to which the ore is attached.

It would appear from the thickness of the mud deposited on this caved ore and quartzite, often 10 in. in depth, that the collapse of the roof is not by any means a recent occurrence. Furthermore, this brown mud deposit might indicate the downward circulation of meteoric waters from the Silurian-limestone ore deposits immediately above. The longest distance so far opened in a vertical fissure in the quartzite is 80 ft.; this fissure shows

three chimneys, the largest 3 ft. by 1½ ft., standing vertical and lined with the same minerals. The openings in the fissures vary from a width of 18 in. down to a mere film or incipient fissure often difficult to follow. Cross fissures also occur carrying the same mineralization, while open joints in the rock are often coated with pyrite or blende.

The ore occurs in the fissures and cavities mainly as a crusted structure with a regular succession of mineralogically different layers, as follows: Argentiferous sphalerite, pyrite, galena and chalcopyrite. The sphalerite and galena are found throughout the entire length of the fissures, while the pyrite and chalcopyrite occur only at infrequent intervals. At points where these cavities take a sudden pitch downward and where "potholes" or other irregularities occur in the floor, pockets of a rich silver-sulphide mineral are found.

The quartzite often shows a honeycomb structure where the channels split up into numerous small cavities, usually along a bedding plane. The cavities are always lined with ore. Invariably a small seam of ore connects one cavity with another and on being followed, in the ordinary course of mining, these seams eventually lead into a large single cavity where the ore has been deposited in much thicker layers.

Fig. 5 is from a photograph of a thin section of the crusted ore structure, a close study of which shows that the cementing silica is removed in greater part near the zone of mineralization, leaving the quartzite quite porous, similar to a soft sandstone. Some fine galena and blende crystals have been deposited in the interstitial spaces in the altered quartzite. The order of mineral deposition is as follows:

(1) Fine galena with a little blende and pyrite on the quartzite about 1/16 in. thick.

(2) Blende and pyrite with occasional spangles of galena, a very distinct crust about ¼ in. thick with a rough crystalline outer surface on which the next layer was deposited, mostly in cavities between crystals.

(3) Chalcopyrite in irregular crystals, but not as a continuous layer.

(4) Massive crystals of galena about one inch thick, sometimes coated with a film of rich silver sulphide.

The high-grade ore from these fissures after being carefully sorted contains 14 oz. gold, 4000 oz. silver and 45 per cent. lead. This is sacked and shipped to the smeltery. The remaining ore contains 0.3 oz. gold; 140 oz. silver; 15 per cent. lead; 25 per cent. sulphur; 17 per cent. silica and 35 per cent. zinc. This is shipped to the zinc smelteries, where the zinc is recovered and the residue carrying the lead and precious metals receives final treatment in the blast furnaces. The last round of holes drilled in the sump of the Tucson shaft, 50 ft. down in the Cambrian quartzite, cut this ore, and so much water, that it was deemed advisable to plug the holes until the station was completed on the level above and the electric pump started up. As the drillings showed some ore, the holes were then blasted revealing a 10-in. seam of galena, blende and pyrite conforming to the dip of the quartzite. Further work opened up the complex of fissures, chimneys and caves above described from which over $30,000 worth of ore was taken out.

Replacement Deposits in Limestone

Immediately above the quartzite deposit just described, the overlying limestone contains a wide, flat oreshoot conforming to the stratification of the limestone and trending north 40 deg. west, in which direction it has been opened up for a length of 950 ft. showing an average width of 65 ft. and a thickness of 20 ft., see Fig. 6. This deposit was formed by metasomatic replacement of the limestone by circulating mineral solutions, which might well have ascended through the channels and cavities afforded by the quartzite fissures, finally depositing their contents in the more soluble limestone formation. The oreshoot is capped by a sheet of gray porphyry which probably served to arrest and hold back the ascending solutions, causing them to spread out laterally and deposit their contents in the underlying limestone.

The white limestone in which this orebody is contained is a compact thin-bedded formation. The beds are separated by layers of clay selvage often an inch or more in thickness. The original structure of the rock formation is distinctly preserved in the orebody, as the clay seams have not been replaced by the ore-bearing solutions. Owing to the impure nature of the lower limestone it has not been thoroughly replaced, and as a result "horses" of country rock are often encountered. The edges of the shoot are extremely ragged and irregular, differing in this respect from the well defined orebodies occurring in the beds of the blue limestone above. There is no sharp line of demarcation between the ore and surrounding limestone.

Frequently a layer of ore, replacing the original limestone bed, will extend farther into the formation than the layers immediately above or below it. This depends upon the porosity of the rock and the strength of the circulating solutions which were prevented from percolating through the adjacent limestone beds by the impervious layers of clay between the bedding planes. At points where the limestone beds were broken by joint planes, the solutions often left the stratum in which they were circulating and passed up along the joint plane and finally spread out along a higher bed in the series and there continued their process of replacement, Fig. 7. The principal minerals are sphalerite, pyrite, galena and chacopyrite, carrying a small amount of silver; they occur in the order given. The gangue is composed chiefly of silica and clay.

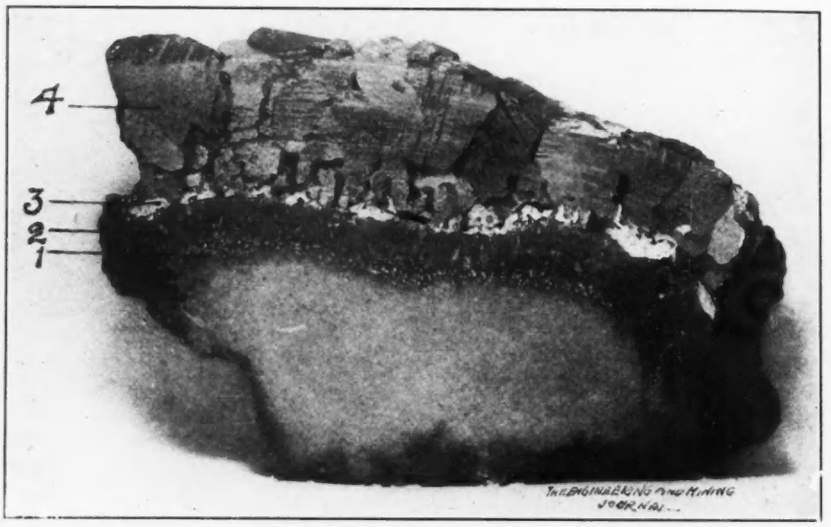

Fig. 5. Section Showing Crusted Ore Structure

The minerals vary greatly in different parts of the shoot and as a result, it is necessary to mine three different varieties of ore, viz: zinc-lead sulphides, zinc sulphides, and copper sulphides. As a general rule the zinc-lead sulphides predominate in the lower layers of the orebody. The lead content diminishes rapidly toward the top until the upper layers contain more zinc and iron pyrites. The top ore is mined solely for its zinc. Where the galena is present in the ore it does not form a homogeneous mixture with the other sulphides, but occurs in a series of thin, distinct layers parallel to the bedding which gives the ore a laminated structure. The miners call it "corduroy ore."

The copper sulphides form but a small proportion of the deposit, and are in the immediate vicinity of the Tucson fault. The zinc ore is often impregnated with chalcopyrite and chalcocite for a short distance surrounding water courses. This condition would seem to point to a secondary origin for the copper ores, the cupreous solution entering the orebody from the Tucson fault. The eastern edge of this oreshoot was intersected and thrust upward on the Tucson fault as is evidenced by the appearance of the ore and limestone beds as they approach the fault plane and the further presence of the Cambrian quartzite on the eastern or hanging-wall side of the fault as previously described and shown in Fig. 2.

Secondary Enrichment

Rich secondary ores have been found in the oreshoot, always in close proximity to the Tucson fault and rarely extending far into the body of primary

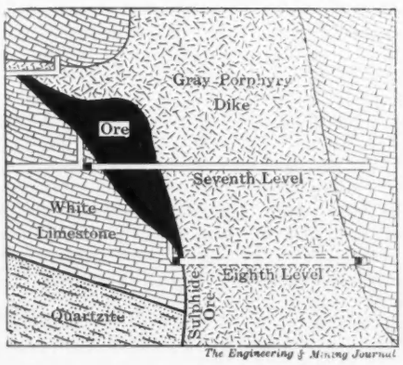

Fig. 6. Section Showing Contact Deposit

ores. These enriched ores consist of a concentration of rich silver and copper sulphides formed by reactions between the primary ores and later circulating solutions. The fault plane has evidently been the medium along which solutions have migrated leaching out minerals in one portion of the orebody and carrying them in solution to finally reprecipitate them at the points where the zones of enrichment are found.

The largest body of enriched ore so far encountered produced 1250 tons of copper-silver ore. The richest ore was found close to the fault, but as the stoping operations receded from the fault and passed into the body of the main oreshoot, the silver and copper content diminished rapidly. The unaltered ore was encountered at a distance of 30 ft. from the fault and consisted of mixed zinc and lead sulphides containing little silver and no copper. The copper exists in the enriched zone in the form of black sulphides and chalcopyrite, while the silver is present as sulphide.

The rich matte-like ore, a sort of steel-grained, argentiferous galena, rich in gold and forming the last film deposited on the laminated ores in the Cambrian quartzite, is no doubt secondary and I believe of comparatively recent formation. I have found depressions in the floor of the ore channels, in the quartzite, filled with this rich ore. It also occurs as an impregnation of the sand underneath the ore, but everywhere shows up as the latest mineral. In places, the bottom of the caves underlying the crusted ore contain 3 to 6 in. of quartz sand resulting from the removal of the silicious cement from the quartzite, thus allowing that rock to pass back again to a sandstone, or loose sand. These sands are invariably enriched and are mined and shipped as silicious ores.

Genesis of the Ore

In Doctor Emmons' preliminary publication issued immediately after the close of the field work in 1887 he stated with regard to the origin of the deposits:

(1) That they have been derived from aqueous solution.

(2) That this solution came from above.

(3) That they derived their metallic contents from the neighboring eruptive rocks.

This summary of Doctor Emmons' views was made more explicit in his

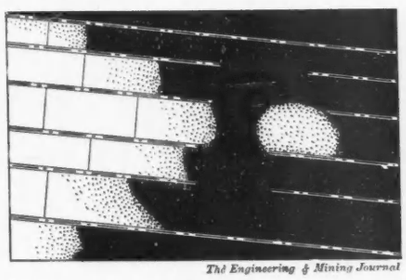

Fig. 7. Edge of Oreshoot in Silurian Limestone

monograph[1] on the Leadville deposits, viz: "With regard to the immediate source from which the minerals forming these deposits were derived, the following conclusions have been arrived at;

(1) That they came from above.

(2) That they were derived, mainly, from the neighboring eruptive rocks.

"By these statements it is not intended to deny the possibility that the metals may have originally come from great depths, nor to maintain that they were necessarily derived entirely from eruptive rocks at present in immediate contact with the deposit."

That these views did not meet with unanimous acceptance by the mining engineers conversant with Leadville ore deposits, is well known. Furthermore the explanations, qualifications and apparent restrictions of the original views in later publications has not rendered them entirely acceptable to those engaged in present-day mining in Leadville; more particularly the statement, "the solutions came from above."

I will not discuss in this paper the various theories of ore genesis. My intention is merely to apply to some of them the facts gathered in four years' active experience on Iron hill, particularly in the development of the white limestone and Cambrian quartzite with diamond drill and mine workings. I wish it distinctly understood that the fissures in the quartzite have not been connected by mine workings with the granite below or the ore deposits in the Silurian limestone above. But the fact is that when the fissures were intersected at a depth of 50 ft. in the Cambrian quartzite, the overlying deposits were immediately drained and have been quite dry ever since. This fairly establishes a connection between the quartzite fissure complex and the ore in the Silurian limestone. The water now entering the workings in the quartzite rises in the fissure system. The Tucson fault, the main drainage channel of the mine, is only 50 ft. from the lowest working and is comparatively dry, proving that there is no

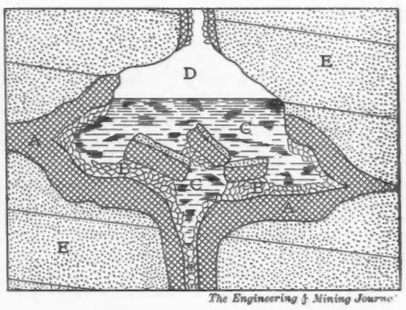

Fig. 8. Cavities in Cambrian Quartzite

A, pyrite and blende; *B*, galena; *C*, mud deposit; *D*, open cavity; *E*, quartzites.

water channel connecting the fissures in the quartzite with the Tucson fault, and establishing at this time an upward flow in the fissures.

I have previously shown what I take to be a secondary deposition of copper in the lower limestone ores introduced along the Tucson fault plane. There is no evidence, however, that this fault has either served to deposit or to enrich ores in the quartzite. The source of the encrusted ores in the quartzite is thus intimately connected with the Silurian-limestone ore deposits and is either primary or secondary. The rich gold, silver and lead ore in the circulating channels and in some of the "pot-holes" is I believe secondary, and comes from above together with the brown mud now partially filling the large cavities, as shown in Fig. 8. The crusted ores deposited in preexisting cavities, in the order previously shown has, I believe, a different origin. The cavities, caves and water courses in

[1] "The Downtown District of Leadville, Colo." *Bull.* No. 320—U. S. Geol. Surv., pp. 60-61.

the quartzite could readily be formed by the action of hot alkaline waters ascending from the underlying granites and eruptives. Similar action is now in progress at the Hot springs in Gunnison county, Colo. If these crusted ores are wholly of secondary origin, it would not only be difficult to account for the formation of the cavities, but also the order of mineral deposition in the crusted deposits. I am, therefore, led to the conclusion that the crusted ores are primary, except as noted—and that the fissure complex served as feeders through which ore-bearing solutions ascended to form, wholly or in part, the ore deposits in at least the Silurian limestone, if not in the Carboniferous limestone itself. So far as I know these are the first ore-bearing fissures discovered in Leadville, carrying ore in vein-like form from some underlying source into the great deposits in the limestone. I have, however, to the best of my ability, given the facts as they appear to me, so that those of greater experience and wider knowledge in the genesis of ore deposits may have the data necessary to reach a correct conclusion on this very interesting occurrence.

Conclusions

The facts described above would seem to lead to the following conclusions:

(1) The mineral contents of even the limestone deposits of Leadville are so diversified that no one theory or source of ore deposition will cover them. The fact that one oreshoot may carry gold in paying quantity and a parallel shoot scarcely a trace, that one hill may contain silicious gold ores and another gold-free iron, is in itself significant. The deposits of copper, bismuth and other minerals cannot be wholly due to secondary causes.

(2) The pay shoots in the limestone are so intimately associated with intrusive dikes and sheets of gray porphyry as to suggest a genetic relation, particularly when the dike walls are decomposed, softened and mineralized, indicating possible vents for gases or channels for circulating waters. Near such places the limestones often carry large orebodies. Furthermore, ore has been found on dike walls in every Leadville formation from the white porphyry to the granite, while today one mine is producing ore from a fault dike in the Archean granite.

(3) The recent Tucson development in the lower quartzite shows that ascending solutions permeating the Cambrian quartzite have also played an important part in the formation of orebodies in the white limestone of Iron hill.

Shipments of chrome-iron ore are being made from the Rhodesian mines via Beira to iron works in America, France, Germany (the Krupps), Holland and Belgium, as well as to British ports.

Operations of French Companies

Special Correspondence

The Chamber of Deputies has reduced the duty on aluminum from 1.5 fr. per kg. to 75 centimes general tariff and 50 centimes minimum tariff.

For the first 10 months of 1909 the lead production of Balia-Karaidin (Turkish Asia) was 9876 tons as against 9870 tons for the same period in 1908. The zinc-ore output was only 366 tons against 2060 tons in 1908, the hoisting having ceased last March. The extraction will enter a new phase at the beginning of 1910, as a new shaft at Ary will soon be in working order. Moreover, the new magnetic plant, which will also be in operation soon, will permit the treatment of the blende, which has lately been neglected.

The new method of sinking by cementing, which has been so successful particularly at St. Pierremont, is being applied at St. Ovold. The Société Internationale de Charbonnages has let a contract for this work, and 24 bore holes have been put down.

During the first six months of 1909 the district of Pas de Calais produced 9,338,757 tons of coal, the output of 95 shafts, against 8,928,431 tons during the first six months of 1908; an increase of 417,806 tons. The principal producers are the mines of Lens with 1,680,055 tons from 16 shafts; Bruay, 1,281,432 tons from 8 shafts; Courrières with 1,189,848 tons from 10 shafts, and Béthune, 1,006,110 tons from 11 shafts. The northern coal basin, with its 46 shafts, had an output of 3,488,673 tons of coal, showing an increase of 86,089, comparing this output with the corresponding period of 1908. The Miñes d' Anzin, of this district, is the principal French coal producer, with an output of 1,681,489 tons from 20 shafts as against 1,680, 820 tons for the corresponding period in 1908.

The districts of Pas de Calais and of the north together produced 918,813 tons of coke and 722,414 tons of briquets as against 900,824 and 632,365 tons, respectively in the first six months of 1908. The districts of Aubin and of Carmaux, second in importance, produced 457,099 tons and 423,950 tons, respectively, against 481,996 and 406,460 tons.

A syndicate proposes to work the iron mines of the Haute-Deule, a concession granted at the end of 1907, situated on the communes of Wavrin, Sainghin-en-Weppes and Annœulin. A deposit of iron carbonate containing 42 units of iron and 2 of manganese is said to exist here. The deposit is estimated at 10,000,000 tons. The estimated working cost is 11.35 fr. per ton.

The shaft at Wittelsheim, owned by the Gewerschaft Amile (Société Alsacienne pour l'Extraction de la Potasse) has struck the first layer of salt of potassium at a depth of 640 m. It is believed that working will soon begin.

A Primer for Suckers

On Nov. 30, 1909, J. Walter Labaree and George W. Emanuel were sentenced to prison, the former for 2½ years and the latter for 1¼ years, for swindling in connection with the stock of the Dos Estrellas Mines and Development Company of Mexico. Operating as George W. Emanuel & Co., they realized over $150,000 from suckers. They were convicted of using the mails to defraud. They had represented that the company owned valuable property, but the Government proved that the alleged mines were simply holes in the ground.

Wallace D. Hopkins was found guilty in Chicago, Dec. 4, of using the mails to defraud in connection with an effort to float the Consolidated Zinc Company a few years ago and on Dec. 13, 1909, was sentenced to 4¼ years and fined $1500. This company was exposed by the Joplin *Globe* and by the Journal.

The stockholders of the Orphan Copper Company are now trying to find out where that concern stands. The absence of merit in this enterprise was exposed by the Journal when it was brought out, and shortly afterward the stock was ruled off from the list of the New York curb market. Cardenio F. King, who was engaged in the market operations, is now serving a term in prison.

Mrs. W. W. Wheeler, a clairvoyant, who was convicted of having obtained money under false pretences by telling patrons they would make fortunes by investing in South Dakota and Nevada gold mines, was sentenced in court in Denver on Nov. 27, 1909, to six years in the penitentiary.

Charles Wesley McCrossan, formerly a Baptist preacher in Los Angeles, convicted of making false representations in the prospectus of a mining company of which he was president, was sentenced in Los Angeles, Dec. 21, 1909, to pay a fine of $4000 or to serve one year in jail. McCrossan said he would pay the fine.

Exploitation of a $40,000,000 railway project in Chile has failed owing to disappearance of its promoter, known as James Jeffrey Williams, following disclosure that he is Harry Silverberg, a well known crook. He had secured a concession from the president of Chile and had enlisted financial support of well known Englishmen.

Careful experiments extending over a period of months has definitely proved that the Kafirs can do more work, man for man, with the hammer type of air drills than can white laborers. The test was to decide if it is economically possible to use Europeans in the mines.

Analysis of Mine and Mill Practice on the Rand—II

No Machine Yet Found to Replace Stamps; Ventilation and Supervision Improved; Central Power Plants; Deep Mining Found to Be Feasible

BY E. M. WESTON*

In addition to the changes in milling practice described in the preceding article, several other metallurgical improvements are being experimented with or have been partially adopted on the Rand. Mr. Salkinson, on the Witwatersrand Deep, successfully employed the waste heat of exhaust steam from winding engines to heat cyanide solutions for the slimes plant, thereby greatly increasing the capacity of the plant and extraction owing to more rapid slimes settlement. The Adair-Usher process has continued to hold its own despite unfavorable criticism from high quarters and has also been adopted by numerous outside mines. The Stark process, of which so much was heard a couple of years ago and by which it was hoped to retreat all the Rand tailings heaps, proved an economic failure except on a few mines where the conditions were favorable.

Ridgway filters were tried at Randfontein but could not compete with the standard decantation process for treating slimes. No metallurgist appears convinced that the all-sliming process is as yet economically profitable. At any rate I am aware of no new plants being designed to carry out the policy to its fullest extent, the extra number of tube mills to be installed in the City Deep mill being obviously intended to facilitate the use of coarse screens in the stamper boxes.

CONCENTRATORS AND CONVEYER FOR REMOVING CONCENTRATES, CASON BATTERY, EAST RAND PROPRIETARY

STAMP MILLS STILL STANDARD CRUSHING UNIT

One hears nothing today of the opinions expressed a few years ago that the gravity stamp would become a unit of little or no importance in the crushing of rock, and that its place might be taken by a series of rock breakers followed by chilean mills. Engineers here seem to be of the opinion that the installation of secondary breakers to reduce the ore before entering the stamps to half- or three-quarter-inch size is unnecessary. In the Simmer Deep mill the ore is broken to 1¾-in. cubes and reduced to pass a 500-mesh screen, aperture 0.033 in., in one operation.

Recent experiments carried on by the engineers of the Consolidated goldfields have gone to show that the economic limit of the stamp mill as a crusher lies between 1¾-in. cubes and 9-mesh screening, and that the duty of a 1400-lb. stamp between these limits is 15 tons per 24 hours. A new type of stamp is being experimented with, having a very long head with shorter stem working in open-fronted mortar boxes.

Engineers are not increasing the crushing area of the shoe in anything like the proportion of increase of weight of stamp, evidently believing that the falling weight per square inch of striking area has not yet reached its economic limit.

The Holman pneumatic stamp is the only competitor of the gravity stamp on the Rand today. The Mines Trials Com-

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mittee, an inter-group committee intrusted with the task of experimenting with and testing any promising metallurgical or mining device, is running one on the Kleinfontein mine at present. One stamp is crushing 80 tons per day and its total cost of installation is said to be half that of ten heads of gravity stamps. It is said that several will be installed as an experiment in a new mill shortly to be erected on the East Rand.

Remarkable increase of efficiency in tube mills is reported by Hamilton's use of a slightly diagonal axis: with an elevation of 10 per cent. it is stated that 30 per cent. increase of efficiency has been gained with 64 per cent. passing a 90-mesh screen.

Underground Haulage

Underground mechanical haulage is being introduced into the East Rand Proprietary mine, and electric haulage will be introduced in the Geduld and other mines of the far East Rand where the grade of the reefs is from 5 to 15 per cent.

The shaking-tray conveyer and plain chute laid on the footwall of stopes continue to be largely employed, and in some cases water is used to assist in moving rock along such chutes. Self-acting aërial trams are still used in large stopes. The Wager-Bradford system of elevated monorail trucks has not been largely adopted as difficulties met with in supporting the line have offset advantages due to decreased friction.

Mine Ventilation

Real attention has been given to the question of ventilation, it having been at last realized that both white and colored miners have been called upon to labor under unfair conditions leading to a too large mortality among both and preventing efficient work. Many parts of even the best ventilated mines are at times unfit for men to exist in. Mechanical ventilation has been installed in the East Rand Proprietary mines and an official appointed to look after this department; it has already been discovered (though the initial cost was £20,000) that the scheme pays.

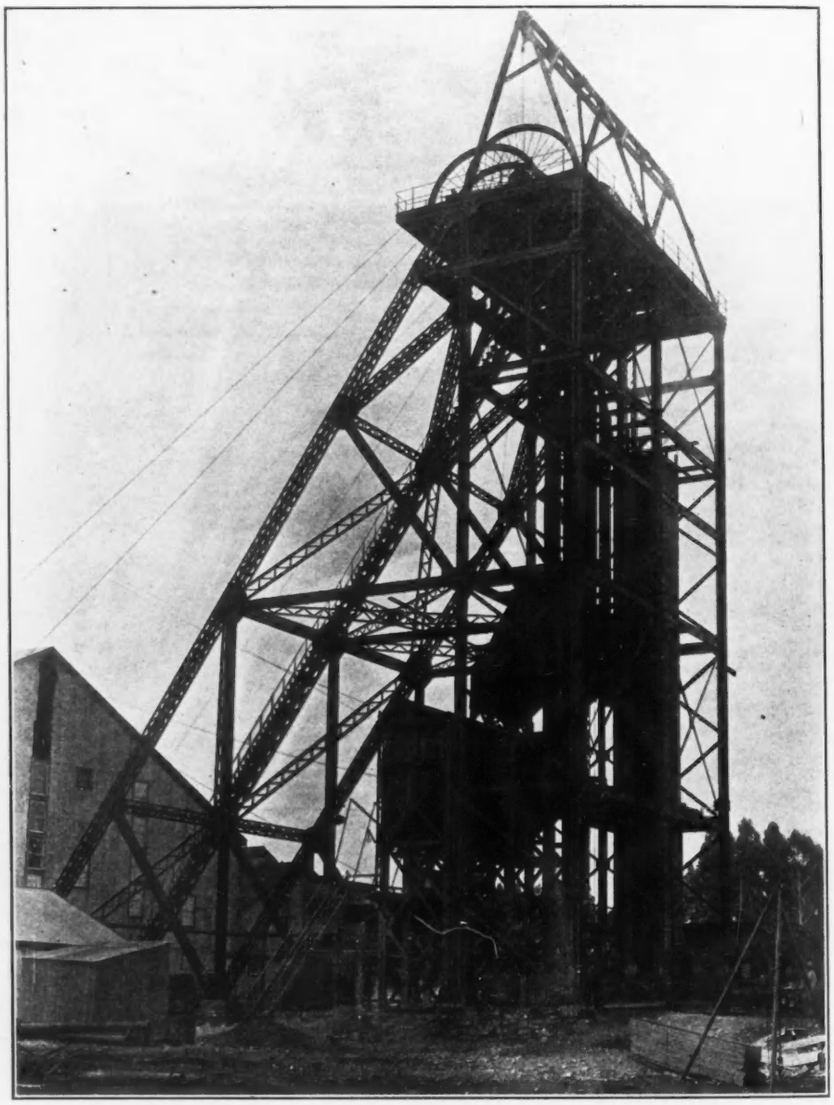
Many of the deeper mines are realizing that something of this sort must be done. Where possible, ventilation is improved by making connection with outcrop mines; but where these mines are working the miners naturally object to having to breathe the waste gases from a large mine below them. For the ventilation of some of the large deeps on the central Rand it is probable that a central upcast shaft, fitted with a suction fan, will be provided.

Gases from Explosives

In connection with the Chemical, Metallurgical and Mining Society a great deal of work has been done by W. Cullen, H. Heyman, Doctors Weiskopf, Moir and others in the investigation of mine gases and the products of explosion of gelignite and blasting gelatin. Some surprising results have been attained; it has been found that even the best grades of gelignite and blasting gelatin produce under working conditions a much larger proportion of deadly carbon monoxide than had been realized before, and that the partial combustion of fuse and wrapper added to these amounts.

W. Cullen showed that the gases after an ordinary blast in a drift contained from 0.011 to as much as 1.28 per cent. of CO and that the ratio of CO to CO_2 produced averaged about 1 to 7, rising sometimes to 1 to 5. W. Cullen and Doctor Weiskopf have, however, succeeded in producing a blasting gelatin in which the proportion of CO to CO_2 has been reduced to about 1 to 17. This explosive is stated to be as strong as ordinary blasting gelatin, and should the miners on this field find it to be so its use will undoubtedly be beneficial.

Blasting gelatin is now delivered on mine sidings at 46s. 6d. per case of 50 lb. so that the Rand is now supplied with the most powerful explosive known at a very cheap rate. Explosives are supplied from a local factory at Modderfontein, from De Beers' factory in Cape Colony, from one near Durban, Natal, and some from Europe.



Steel Headframe, City Deep Mine

Electricity the Future Power

The next year will see the policy of electrification of the Rand well on the way to realization. At the present time the Randfontein and the East Rand Proprietary mines have their own central power stations. The Victoria Falls Electric Power Company has abandoned the somewhat far-fetched project of taking power from Victoria falls, Rhodesia, to the Rand and is erecting central steam-driven generating stations in the vicinity of Johannesburg. At Brakpan, on the East Rand, the company has two 3000-

kw. Curtis turbines and an older generating plant driven by vertical engines. It has also a similar old plant at Dreihoek and has recently completed a station containing four 3000-kw. sets driven by Curtis turbines at Germiston on the East Rand. These deliver 3-phase alternating current at 10,500 volts at 1500 r.p.m. These turbines are set horizontally and are 4 ft. in diameter and 5½ ft. long.

Great attention has been given to ventilation of the generators, and the bearings are water cooled. Slack coal is largely used, delivered from the rail trucks into bins, from thence elevated to hoppers above the boilers and falling from there through automatic measurers to the feed hoppers and chain-grate stokers.

There are 16 Babcock & Wilcox water-tube boilers of 1500-2000 h.p. placed in two rows and generating steam at 215 lb. pressure; superheaters raise the temperature to 670 deg. F. and Green's economizers raise the feed-water temperature to about 200 deg. F. Forced induced draft is used. The draft is caused by centrifugal fans forcing a jet of air into the base of upcast chimneys shaped like inverted cones, producing a suction through the fire boxes. Surface condensers give a high vacuum.

Turbo-Compressors Used

A contract has been entered into to supply 270,000,000 Board-of-trade units at a load factor of 70 per cent. to completely electrify all the 15 large mines controlled by the Rand Mines, Ltd. In the mines all steam plants will be discarded. Eight sets of turbine generators of 12,000 kilovolt-amperes totaling 100,000 h.p. will be provided. Of these about 30,000 h.p. will be generated on the Vaal river at Vereeniging where coal and abundant water are available, and transmitted by a power line to the Rand. The remainder will be generated within 30 miles of the Rand, probably near the Klip river. The transmission line from Vereeniging is estimated to cost £130,000. About 40,000 h.p. will be devoted to working central compressed-air plants; one of these will be steam driven from boilers already available at Brakpan, another will be near Germiston and another on the central Rand.

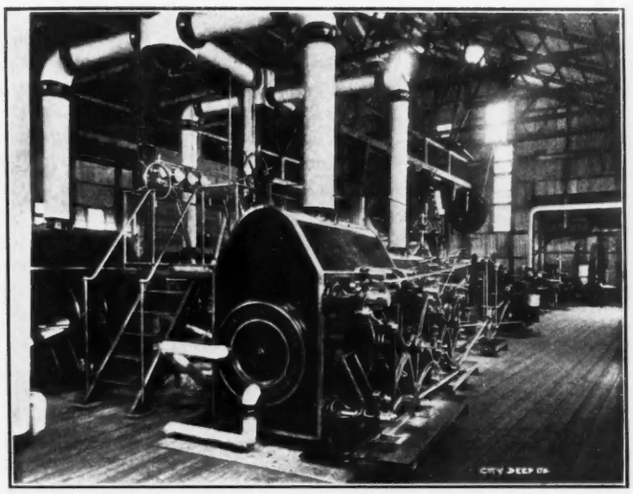
The sets will be of about 8000 h.p., compressing air in two stages to 100 lb.: the first stage will be to 30 lb. by 3000-h.p. turbo-compressors of the Rabeau or Zoelly type. One compressor of the Zoelly type is working at Brakpan now. Five thousand horsepower will be devoted to driving 2-stage reciprocating compressors by synchronous motors from the main station. Air will be distributed to the mines by mains having joints welded by oxy-acetylene blowpipes.

Central Power Stations Reduce Costs

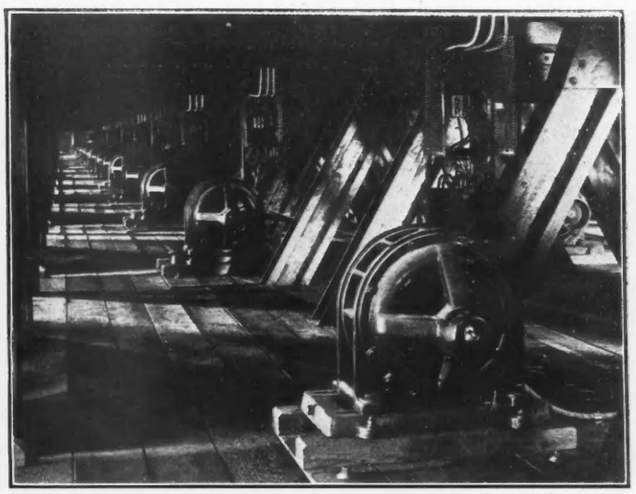
These central stations are expected to reduce costs on the Rand mines from 6 to 8d. per ton. The price to be paid per kilowatt-hour has not been disclosed, but it is probably from 0.75 to 0.5d. The municipal station, a small plant not yet provided with the most efficient working facilities, works at 0.6d. and the Randfontein at 0.5d., so that a large central station should be able to supply at a very cheap rate and yet earn large profits.

It is estimated that two years hence 25,000,000 tons per annum will be crushed on the Rand, and that a total of 500,000,000 units will be required annually. The stations to supply the Rand mines are to be completed by October, 1910, in order to be available for the City Deep when it is ready to crush. The initial cost of equipping mines is expected to be reduced from £50,000 to £100,000 by the provision of electric power.

The East Rand Proprietary Mines Company has long had a central air-compressing station and is adding two of the largest steam-driven compressors yet made to supply 96,000 cu.ft. per min. at 90 lb. pressure. These will be made by Keelerton, Hodgart, Barclay & Co., England, and will be fitted with Meyer valves. Steam will be delivered at 180 lb. Two underground electric hoists have also been ordered to lift 6650 lb. of rock in 5000-lb. skips up a 45 per cent. grade 3500 ft. Skips will be balanced and will run at 3000 ft. per min., and also at 500 ft. per min. for inspection purposes. Two cylindrical drums will be 8½ ft. in diameter and 4 ft. 9 in. wide. The motors will be made by the Allgemeine Electricitäts Gesellschaft of the 3-phase induction type direct coupled to the drum shaft with a normal load speed of 111 r.p.m. These motors of the 6-pole type will work at 3000 volts with 25 cycles per second. The starting and regulating control will be of the Allgemeine Electricitäts Gesellschaft liquid type, regulation being effected in the rotor circle of the motor.



Corliss Winding Engine, City Deep No.2 Shaft



Motors and Steel Bin Construction, Simmer Deep

Mine Supervision Improved

Supervision of work underground has greatly improved; the leaders of the mining industry realize now that in the administration of a large mine there is not only work for an eminent consulting engineer and the best manager obtainable, but managers need ample assistance. Inadequate supervision is the poorest economy. Many changes are taking place, and among them is the practice of allowing the manager to have a qualified assistant as right-hand man. The tendency is to divide the underground workings into sections under separate mine captains or shift bosses, supervised in turn by an underground manager.

Comparative cost keeping, though sometimes somewhat overdone, is largely used for checking the comparative work of mines. The mines of the large corporations have their monthly returns thus

checked and the managers have their attention constantly drawn by the head office to various items of expenditure which appear to require explanation.

Possible Depth of Mining

The prospects of mining to great depths depend: (1) On the grade of rock to be expected; (2) on the underground rock and water temperatures met with; (3) on the pressures tending to break down the roof of excavations. Should these not be such as to make mining unpayable or impossible the problems of haulage and ventilation should be easily solved.

Recent temperature tests at a depth between 3000 and 4000 ft. in the Cinderella Deep, Robinson Deep, Simmer Deep, Jupiter, Brakpan and other mines have tended to show that the temperature rises at the rate of 1 deg. F. in 255 ft. vertical, as against the figure given by older experiments in Europe of 1 degree in 65 feet. At the bottom workings of the Jupiter mine, 4400 ft. from the surface, the rock temperature is 82 deg. F. At this rate the temperature at 7000 ft. vertical would be from 92 to 93 degrees.

The outcrop of the main reef is known for about 60 miles, and taking the average dip at 30 per cent (about 17 deg.) this would give a dip measurement of about 14,000 ft. to a vertical depth of 7000 ft. On the far east Rand there exists a vast basin, eight or ten miles square, whose deepest point is about 5000 ft. so that the area of possible future work is a large one.

The question of average grade in depth is still an open one. There have been severe disappointments and agreeable surprises in the Deep mines (1000 to 2000 ft. deep) as well as in the Deep Deeps (2000 to 5000 ft. deep). One would be inclined to say that there is a larger proportion of unpayable ground at great depth; but a mine like the City Deep could be adduced to disprove such a statement.

The chairman of the Modderfontein Outcrop mine lately pointed out that the grade of ore developed in that mine was almost similar to that in the Deep Deep mine at a depth of over 3600 ft. on its dip. In the Turf mines shaft of the Village Deep the south reef was struck at 3894 ft., assaying 6.9 dwt. over 41 in., and the main reef leader at 3994 ft., assaying 6.8 dwt. over 51 in. A disquieting feature was, however, the meeting of a spring of heated water during shaft sinking.

The Future of the Rand

Falls of ground have already occurred in some of the deeper levels which may or may not be due to increased pressure. This may have been due to reckless mining. Careful mining by leaving pillars of sufficient area and packing stopes with waste rock or sand should render mining possible at extreme depths, and there is a possibility of the dip of the reef becoming so small that long-wall methods might become common in the deepest mines.

The Rand is most favorably situated for the supply of cheap steam-generated power, and it was recently stated that ore could now be hauled as cheaply from 3000 ft. as a few years ago from the outcrops. It is hard to estimate what the ultimate life of the Rand will be, but it may be taken as certain that recent increases in crushing capacity will more than offset the quantity of low-grade ore rendered available in most producing mines today.

The chairman of the Rand Mines, Ltd., stated recently that the reduction of working costs had reduced the percentage of unpayable ore developed in all the mines of this company from 16 per cent. in 1905 to 11 per cent. in 1909. Certainly other low-grade bodies remain undeveloped; but one would be inclined to estimate that at a rate of production of 25,000,000 tons per annum, 15 to 20 years would see the exhaustion of most of the ore in the present mines above 4000 feet.

There is, however, still room for development in tracing the reef along its outcrop, especially in the western Rand. The West Rand Estate claims to have found by boreholes a payable reef for a stretch of ten miles under the dolomite.

Smelting Rates in Mexico

By Thorington Chase*

A close competition between the Mexican smelters has led to rather uniform smelting rates in most sections. The encouragement of newly developed properties has always been aimed at, and the minor clauses in contracts leave much latitude to the discretion of the ore-buyer. If a mine be new and there is a possibility of developing a large tonnage within a reasonable time, favorable terms are made the seller and his shipments are smelted at a minimum smelting margin. Where the tonnage is large and the ore especially prized for the fluxing qualities it possesses, the smelting charges may also be low. Much depends upon the "insoluble," iron and lime contents of the ore, and the position of each smeltery in relation to ores of certain desired consistency. Naturally the producer of self-fluxing ores has a great advantage.

Payments

In general, all the smelters pay for 95 per cent. of the silver (if not under 50 grams per metric ton), at New York quotations. One gram of gold is usually the minimum, all over that being paid for at current price, though a deduction of 2½ per cent. of both silver and gold values is made for the Federal tax.

When amounting to 5 per cent. or more, 90 per cent. of the lead contents are paid for at an adjustable rate per kilogram (which varies with the London lead market), with £13 lead as a base. For each fluctuation of a shilling (or, as is often the case, shilling and a fraction) which the price of lead undergoes, there is a premium or deduction of so many cents per hundred kilograms.

Copper is paid for at 90 per cent. of the content (cyanide assay, less 1.3 per cent.) at Engineering and Mining Journal or other weekly quotations for cathode copper, a deduction of about 9c. being made per kilogram, if under 10 per cent. copper, with deduction somewhat lower per kilogram for higher assays. The minimum paid for varies considerably among different smelters, and depends largely upon the copper contents of their charges.

A premium (which may vary considerably in purchase contracts, even with the same smelter) in the neighborhood of 17 centavos per unit, is paid for the combined manganese and iron. Lime, when not combined with fluorine, is paid for at the rate of 12 centavos per unit.

Penalties

Turning to the penalties exacted by the smelters, the principal one is for silica; yet here again no firmly fixed deduction can be quoted, though in the majority of cases it is 25 centavos (maximum) per unit. In lead ores, 8 per cent. zinc is usually allowed, and above that deductions are made at the rate of 50 or 75 centavos per unit, this *pena* not being effective beyond a maximum charge per ton of, say, 7.50 pesos. A low percentage of sulphur, varying among the smelters, is allowed (usually around 1 or 2 per cent.) and a rate, closely following that charged for zinc, obtains up to a specified maximum per ton (which is somewhat under the zinc maximum). Arsenic, antimony and bismuth combined, above 3 per cent., are charged for at 75 centavos per unit.

Freight and treatment charges vary according to the lead contents of the ore, and the rates as usually quoted include freight from the railroad shipping point (f.o.b.) to the smeltery. For example, an ore is valued at not over 25 pesos per ton. The maximum rate will be for the minimum lead contents allowed the shipper. For each per centum above, a different rate obtains, the deductions from the freight and treatment charge increasing between the units of lead as they ascend until, say, 15 per cent. is reached, when a flat deduction per unit becomes operative. It is plain that if the mine be near the smeltery and the ore rich in lead, in place of deductions for freight and treatment, the shipper may receive premiums. This acts as an incentive toward more careful cleaning of the ore.

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Unwatering the Mexiamora Mine at Guanajuato

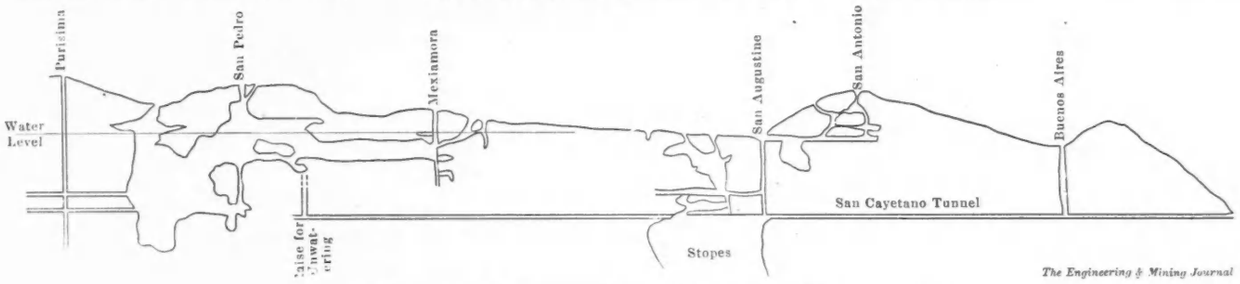
Many Attempts Failed; Work Hindered by Water and Gas; Final Success by Raising from Tunnel Level; Connection Made by Heavy Blast

BY F. H. CLARK*

The accompanying vertical section along the San Cayetano vein in Guanajuato, Mex., shows the situation which induced the San Cayetano Mines, Ltd., to undertake the unwatering of the Mexiamora mine and incidentally the partial unwatering of the San Pedro and Purisima mines. These three mines were worked in the olden days by means of "malacates," or horse whims, until the time arrived when the flow of water and carbonic-acid gas made operations unprofitable and they were allowed to fill up.

The ores of the Mexiamora mine are high in iron pyrite. The decomposition of this together with that of the old mine timbers made the mine water extremely acid. The reaction of the acid on the soluble material in the vein produced a water heavily charged with carbonic acid, ferrous sulphate and sulphuric acid.

The two-mile tunnel of San Cayetano extending under the Mexiamora mine at a depth of 1000 ft. offered so good an opportunity for drainage and ventilation that several attempts had been made by previous owners to open a connection for these purposes. The first plan tried was that of boring a hole to tunnel level from the bottom of the Mexiamora shaft by means of a churn drill of the type used in boring oil wells. This attempt failed on account of difficulties with the casing in loose rock in the bottom of the shaft, and also because the tools were destroyed by the acid water. The other attempts were to open connections by raises from the tunnel level. These failed because the ground caved badly and the gas drove the men from the work.



SECTION ALONG SAN CAYETANO VEIN SHOWING TUNNEL AND RAISE

PROBLEM OF SAN CAYETANO COMPANY

Last year the new owner of the property, the San Cayetano Mines, Ltd., decided to make at attempt to unwater the old mines by means of a raise on the vein from the tunnel level, a vertical distance of 350 ft. to the point of connection. The point of attack chosen was the site of one of the previous attempts, an inclined raise partly on the vein at the extreme inner end of the tunnel. This raise had already been driven 280 ft. at an average incline of 50 deg., leaving about 200 ft. to be driven on the incline. These data were taken from old surveys which were known to be unreliable and incomplete, and the uncertainty as to the exact point of connection added much to the difficulty of the work. Assuming these figures to be correct, there would be a head of water of 250 ft. at the point of connection.

The original plan was to clean and retimber the old raise, which had caved badly, and to unwater the mines from the top of the working by means of a diamond drill. This plan had to be abandoned because no drill runner could be found to undertake the work on account of the danger and uncomfortable working conditions. The foot of the raise is 3000 ft. from the nearest ventilating shaft in the tunnel and air was brought in from this point through an 8-in. pipe. By means of a ventilating door the natural draft of the shaft was used supplemented by a No. 6 Buffalo blower.

The retimbering of the old raise was carried out without especial difficulty and raising commenced in the new ground. After advancing 15 ft. water started from the face at the rate of 50 gal. per min. This water was heavily charged with carbonic-acid gas and at times spurted out with the force of a fire nozzle. That this came from the mine above was shown by the gradual lowering of the water level in the Mexiamora shaft as the work progressed.

As the raise advanced the character of the vein and hanging-wall rock changed. The quartz in the vein became soft and badly broken up and the hanging-wall rock, a decomposed andesite breccia, softened into a clay-like mass containing boulders of harder rock. These conditions made it necessary to adopt a system of spilling and breast-boarding and progress was necessarily slow, especially as rushes of water or gas frequently drove the men from the working face. At no time was it easy to keep lights burning near the top of the raise. Not the least of the difficulty at this point was due to roaring noises, resembling thunder, which were continually heard around the raise and which terrified the men and made it difficult to keep them at their posts.

This portion of the raise was timbered with shaft sets of 8x8-in. timber. The chute was 3 ft. by 4 ft. 2 in. in the clear, and the manway was 2 ft. 6 in. by 4 ft. 2 in. Heavier timber could have been used to advantage in this ground, but all timber had to be brought up on the backs of men.

INCREASED DIFFICULTY AS WORK PROGRESSED

At a distance of 75 ft. from the expected point of connection, the increasing weight of the ground gave a great deal of trouble. The descending waters washed out the talcy material surrounding the boulders and the latter settled, at times with sufficient force to break the breast-boards. The caving following such accidents greatly delayed the work. It was thought that if left to itself the water would make its own connection; accordingly the top of the raise was left open and the ground allowed to cave. The cave ran up along the hanging-wall of the vein for a distance of about 50 ft. when the unsupported hanging-wall material began to fall and the cave assumed a funnel shape. As the top of the funnel increased in area the ground caved so rapidly that it choked the top of the raise and dammed back the water. It soon became evident that the connection could not be made in this manner.

While this work was in progress provision was made to prevent the flooding

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of the lower workings shown in the section. The floor of the tunnel for a distance of 1000 ft. is more or less on a fill of the old stopes, which would be difficult to seal. For this reason it was decided to build a bulkhead close to the foot of the raise and to regulate the flow of water through this by means of pipes and valves. The bulkhead was built of masonry, 10 ft. thick and with a radius of curvature of 10 ft. It was provided with three 3-in. pipes fitted with valves and with a 2x5-ft. doorway. The door was made of 10x10-in. pine timbers placed horizontally and bolted together. On both sides of these timbers 2x12-in. plank were nailed vertically, and the entire door covered with a coat of pitch. This door was calculated to resist the pressure due to a head of 550 feet.

During the entire progress of the work the flow of water was measured four times per day by means of a small wier, and the men were withdrawn from the work in case an increased flow indicated that the water might break through from above. When it was found that the connection could not be made by caving it was decided to carry the raise the probable remaining 75 ft. with a single compartment and small tunnel sets. These sets were of 8x8-in. pine, 3 ft. center to center, 5 ft. 6 in. by 2 ft. 8 in. in the clear. The compartment was a continuation of the chute and so arranged that in case of a rush of water the flow would be down the chute, leaving the manway clear for the escape of the men.

Connection Made by Heavy Blast

The single compartment was carried up 35 ft., at which point a safety hole was driven ahead by churn drilling. Bits were welded into lengths of 1-in. pipe and as the hole advanced the drill was lengthened by screwing on more pieces of pipe. The drill was operated by four men at a time, two gangs relieving each other every 20 minutes. Bad air, close quarters and frequent caving of the hole made it impossible for the men to work to advantage and the best speed made was 3 ft. in one shift. The hole was carried up 40 ft. when the bit was jammed by a cave and lost. Three small shots were fired in the hole and it was considered safe to advance the raise.

Another 35 ft. brought the top of the raise almost to the expected point of connection. From this point another safety hole was driven up 16 ft. A slightly increased flow of water and a considerable increase in gas indicated the proximity of the workings above. The top of the hole was chambered with 10 sticks of dynamite and 75 lb. of 60 per cent. dynamite were placed in the chamber. Experiment had shown that the men reached the bulkhead in 12 minutes from the top of the raise. The shot was fired by three fuses, each 50 ft. long. This guarded against a misfire and gave the men over 30 min. to reach a point of safety behind the bulkhead. Lights were left at intervals along the raise to facilitate their descent.

The explosion of this shot opened a chamber over 3 ft. in diameter. This was enlarged a little and filled with 500 lb. of 60 per cent. dynamite which was fired in the same manner as the previous charge. This shot opened the connection; the water was caught behind the bulkhead and the flow regulated by the valves to the maximum amount which the ditch would carry through the old workings, about 700 gal. per min. At the end of 12 days the flow diminished and the water level in the shaft indicated that the mines were nearly, if not entirely drained.

The escaping water had carried with it large quantities of carbonic-acid gas which completely filled the workings out to the ventilating shaft. By running the blower as an exhauster, and by absorbing large quantities of the gas with lime, it was made possible to work in the raise two weeks after the unwatering. In this connection it was calculated that a ton of the local lime would absorb 9000 cu.ft. of carbonic-acid gas. It was found that the rush of water and rock had carried away all the timber in the upper 150 ft. of the raise. This is now being reopened to establish ventilation which will make it possible to examine the upper mines.

The Sulphur Industry

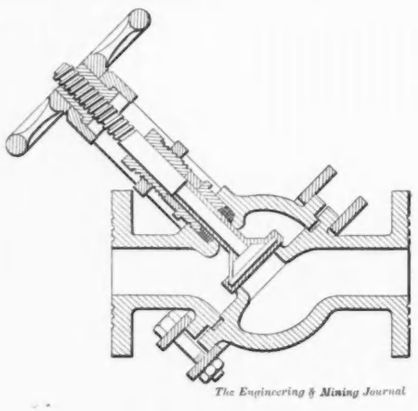
As far as it is possible to ascertain, the home production of sulphur in 1909 was slightly below that for 1908. This was due to a reduction of the stocks on hand held by the principal American producer. The 1909 output will probably total at a figure nearer that of the consumption than was the case in previous years when large stocks were piled up. Prices remained constant throughout the year at $22 per long ton at New York for prime Louisiana sulphur and $22.50 at Boston, Philadelphia and Baltimore. Quotations on roll sulphur were firm at $1.85@2.15 per 100 lb.; $2 @2.40 for flour; $2.20@2.60 for flowers sublimed. The Sicilian brimstone was held at the same figure, but could not compete successfully with the American producer at even prices on account of the importer not being able to offer the same facilities to the consumer as does the American maker, and also due to the natural preference here for home produce.

Trade returns for the first 10 months of 1909 showed that the imports of sulphur were 23,813 tons and exports, 31,902 tons, an excess of exports amounting to 8089 tons. (Importations at San Francisco, Cal., and Portland, Ore., for the first 11 months of 1909 were 13,305, which represents in great part sulphur from Japan). For the same period of 1908 imports were 18,751 tons, exports 20,046 tons, or only an excess of 1295 tons exported. This shows plainly that we produced more sulphur in 1909 than was necessary for our own consumption; the large exports may also account for the Consorzio's holding down the price of Sicilian sulphur imported into the United States.

Returns showed that the export of sulphur from Sicily for the first nine months of 1909 were only 282,015 tons, as against 301,127 tons for the same period of the year before: Stocks on hand, Oct. 1, 1909, were 654,151 tons, and Oct. 1, 1908, 621,016 tons. The exports to North America for these periods were respectively 11,123 tons (1908) and 12,878 tons (1909), but during the first nine months of 1909 only 4877 tons of foreign sulphur were imported into New York and this figure probably covers nine-tenths of that brought into the United States from Sicily.

A New Acid Valve

A valve called the Ruppel acid valve, designed to withstand the hard service of modern chemical plants, has just been brought out. One of its advantages is that it can be set at any angle and serve as globe, angle or corner valve. It can be repaired and reground while in place.



Ruppel Acid Valve

Ordinarily these valves are made of hard lead but any other composition can be employed. The sizes range from 1¼ to 8 in., and each valve is tested to 115 lb. before leaving the shop. All parts are interchangeable. There are also pipe couplings made of a similar design which serve to connect pipes at any angle. The valve and coupling are being placed on the market by A. Innerhofer, 30 Church street, New York.

Pitchblende has been found in Gilpin county, Colorado, at the German mine. One pocket of this mineral has been taken out and stored.

Labor Troubles at the Homestake Strike

In the *Daily Call* of Lead, S. D., a communication, signed "A Miner" under date of Dec. 26, 1909, presents some interesting inside facts about the labor situation at the Homestake mine. This agitation of the Western Federation has resulted in the suspension of operations of that important property and the enforced idleness of the several thousand well-paid laborers who were engaged in the extensive activities of that company's mines and mills. Extracts from the article herewith given indicate the trend and development of the situation and disclose the motives and purposes back of the movement. The communication says in part:

"The latter part of September of this year, there arrived from Denver, Colo., three persons, Mrs. Langdon, representative of the *Miners' Magazine*, James Kirwan, member of the executive board of the Western Federation of Miners, and Mr. Tracy, official organizer of the same organization. Everything was peace, quiet and serenity in Lead, the Homestake was running as it always had, men were content, they worked harmoniously, satisfied with the conditions under which they were toiling, their hours of labor were satisfactory, their pay as good as that paid for like work anywhere, they had good air, good bosses, and their pay was as sure as fate.

Mass Meetings Held

"A few days after their arrival a mass meeting was called for the purpose (so it was said) of more fully organizing the workers of Lead and Central City. The 'trio' mentioned were the speakers. Each one of the three assured us that Lead was known throughout the country as 'the model mining camp.' They told us we were working under more favorable conditions than existed in any other in the jurisdiction of the federation; that our local union was known everywhere for its charity, benevolence and its magnificent building. They told us these were good things, but of no avail, and in order to have the favor of the parent body (Western Federation) we must at once organize not only industrially, but politically as well; we must become class conscious.

"Another mass meeting was called; Mr. Mahoney told his hearers at this meeting as well as at the regular union meeting on the night following, that right here was a camp working under the best conditions of any that he had visited, and he understood there had never been any trouble here between employer and employees, but with all this the Western Federation was not satisfied and would not be until every worker here belonged to the federation and thus contributed his share to the maintenance of the organization. In short, it would either have to be a 'union' camp or a 'scab' camp, that although the men here seemed to be satisfied with their conditions, they were not getting the full product of their labor, and he thought it about time they were asking for more. He did not say that this plan of organization was for the purpose of making a demand for an increase in pay or for the ultimate confiscation of the Homestake property, but he did assure them that organization and political action along socialistic lines would make us the bosses and the other fellow the digger, and that a man must be a socialist to be a good union man.

"The socialist element by this time considered they were sufficiently organized to spring another number on the program. The resolution stating we would not work with non-union men after Nov. 25, 1909, was the result. It is true that a great many men, not socialists, voted for this resolution. Many were led to believe it would be used only as a bluff to bring in the hesitant, who required some sort of persuasion, and that they would be revoked before the time specified for their becoming effective, while others, afraid of the abuse and ridicule which would be heaped upon them did they oppose, voted with the crowd.

False Reports by Committees

"Committees were now appointed for the purpose of seeing all non-union men throughout the mine. These reports were so flattering we were led to believe that long before Nov. 25 everything would be completely organized and there was absolutely no danger or desire for trouble. The committee that had interviewed Mr. Grier reported that gentleman to be in hearty accord with the movement and stated he had urged them to go on with the work. This report has since been proven to have been utterly false and unfounded, made purposely to deceive those who had the welfare of themselves and the community at heart and would therefore have put an end to further agitation, had they known the company to be opposed to the action taken. About this time the Homestake company made its first move in the controversy by bringing suit against the union for the acts of some of its committeemen. To the rank and file this came like a thunderbolt; it was learned that some of the committees had given false reports and others had used threats to induce men to join. The conservative forces got busy at once. Mr. Tracy and others of the leaders were seen and told that the resolution must be withdrawn, that they would not stand for trouble with the company, in fact, they would leave the union unless such was done. A promise that the resolution would be withdrawn at the next meeting was given, but like all socialistic promises, made to be broken, this was no exception.

"Each party had now made its first move—the union through its outside socialist agitators, the first; the Homestake company, in sheer self-defense, the next."

The communication then sets forth the negotiations with Mr. Grier, the results of which were misrepresented to the meeting of the laborers by the committee having charge of these negotiations. It discusses the personal attack made on Mr. Grier through the newspaper organs of the union which led up to the second move on the part of the company which was a notice that all loyal, self-respecting men could remain in the employ of the company by forswearing their allegiance to an organization when the stand taken by it became un-American and criminal.

The socialist wing of the organized labor then called a mass meeting to condemn the action of the Homestake company, before which Mr. Grier appeared, reviewing the various acts of the union which led up to the issuance of the notice by the company. At this meeting Freeman Knowles, in the words of the communicant, "was allowed to freely insult the man who could do more and has done more for labor organized and unorganized than a thousand Knowles could or would do."

An attempt was then made to have the resolutions withdrawn as a basis for settlement but this attempt, according to the communicant, was frustrated by a campaign of direct deception and fraud, in which the union members were led to believe that a satisfactory arrangement of terms was practically assured. At the meeting of Nov. 21 the article states that Chris Christiansen said:

"'No, we did not settle, and by G—d, we won't settle until 50c. or $1 a day is tagged to our pay. The Homestake has run us a long time, now we are going to run the Homestake; boys, it belongs to us, and by G—d some of these days we will take it.'

No Referendum Vote

"Permission for strike had been voted. However, the leaders realized that in order to make it legal in accordance with the constitution and by-laws of the federation a referendum vote would have to be taken, and should this be done, they would yet be defeated in their effort to bring about a strike; consequently, Mr. Ryan moved that Mr. Kirwan be empowered to have full authority to call a strike at any time he saw fit. This

motion was carried, although not one-third of the members present voted for it, thus invalidating the vote of 2000 men, and placing the judgment of one man, and he a paid agitator, against the sane and impartial judgment of the men most directly interested.

"In the face of the fact that a strike might be called at any minute the company made no move, but waited for the next act of the union, and this came on Monday evening, Nov. 22, 1909. At the regular meeting of the union that night, after matters had been fully discussed and it became evident that Mr. Kirwan was about to use the authority conferred upon him by calling a strike, Mr. Thomas, a hoisting engineer, asked Mr. Kirwan that, if in the event of a strike being called, the hoisting engineers should be allowed to remain at their post long enough to hoist any perishable property that had to be brought to the surface, such as horses, powder, fuse and the like. Mr. Kirwan answered:

" 'When I call a strike, everything will stop, by G—d, things will be closed tighter than h—l. I'll show them what the Western Federation can and will do.'

"The company could not and would not take a chance of allowing its animals to starve in the mine, and as they were necessary for the successful operation of the mine, work could not be carried on after their removal, therefore the only thing left to do was to suspend operations.

"Thus again was the company compelled to act in self-defense, and instead of locking out its employees, the employees, through their socialist leaders, locked themselves out, and this in the name of unionism."

The union voted the strike Nov. 21 and Nov. 24 the company shut down all operations.

A card system has recently been established by the principal operators in the Black Hills district, and it is stated that the Homestake company is gradually resuming operations with nonunion labor.

Cyanide Practice at El Tajo Mill, Jalisco, Mexico

The Tajo Mining Company, San Sebastian, Jalisco, Mexico, recently completed the installation of a 10-stamp mill and cyanide plant, which may be considered typical of some of the smaller reduction plants in Mexico. It consists of 1 crusher, 2 feeders, 2 five-stamp batteries, 1 cone classifier, 1 tube mill, 40 in. by 16 ft., 4 conical-bottom agitating tanks, each 16 ft. in diameter and 20 ft. deep, 1 Burt filter press, 1 clarifying tank, 2 zinc boxes, 2 large sump tanks, pumps, etc. The plant is constructed on a selected millsite whereby the ores are worked by the gravity system from the mines to the tailings dump.

The capacity of the plant is 30 tons of ore per day, milled through a 20-mesh screen and reground with tube mill to between 150 and 200 mesh. The chief chemist, George F. Bridger, recently employed by El Oro Mining and Railway Company, has charge of the chemical department, and after a series of experiments has succeeded in securing a high extraction of the metal contained in the ores.

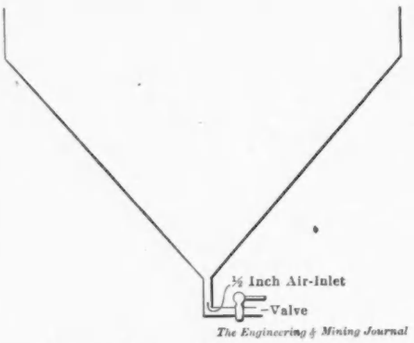
Cyanide Process at El Tajo Mill

The ore is usually highly silicious, but occasionally carries calcite. The valuable metals are gold and silver, the gold being in a fine state of division and the silver present chiefly as sulphide (argentite) with some bromide, chloride and native. The ore is crushed in cyanide solution, the solution being kept at 0.04 per cent. KCN and carrying 1½ lb. CaO per ton. The necessary lime is added at the ore bin.

From the batteries the pulp passes to a Callow thickener in which an upward current of compressed air is used in place of the usual ascending current of solution under pressure. A slight agitation is thus gained in the cone and the coarse pulp well aërated before passing into the tube mill.

A considerable extraction is made in the tube mill, as the thorough agitation and aëration together with the heat generated by the friction of the pebbles makes conditions for the extraction almost ideal. Hard pieces of ore are used for pebbles. The tube mill product is resized, the oversize being returned for regrinding. The slimes and fine sands are overflowed from the Callow cone and conveyed together with the fine tube mill product through a launder to the collecting tank.

The treatment tanks are used as collectors, being provided with an overflow pipe for the weak clear solution. When a sufficient charge has been collected, the pulp flow is changed to another tank and sufficient sodium cyanide added to bring the solution up to 0.15 per cent. KCN. The lead salt is added and agitation begun.



Cone Bottom Treatment Tank

The treatment tanks are cone-bottomed, the cone sloping at an angle of 60 deg. The manner of introducing the compressed air can be best shown by the accompanying sketch. Four agitations or washes are given to the pulp, the first agitation being 12 hours, and each of the remaining ones four hours. Five hours is allowed for settlement and the clear solution decanted to sand filters, clarified and passed through the zinc boxes. After the fourth wash the pulp is discharged to a Burt rapid filter, and sufficient wash water passed through the cakes to keep up the mill stock. The cakes, carrying 30 per cent. moisture, are then discharged to the arroyo.

The extraction, calculated upon the assays and bullion shipped, is 98 per cent. of the gold and 94 per cent. of the silver. The precipitate averages 75 per cent. metal. All zinc shorts are returned to the zinc boxes, no acid treatment being used.

The labor required to treat 1000 metric tons per month is as follows: Two solution men at one peso each per 12-hour shift; for cleaning up, 3 peons at 75 centavos per day, for eight days; Burt filter, 2 peons at one peso each per shift; or at total labor cost of 0.138 peso per ton for cyanide operation.

The chemicals, etc., used per metric ton treated are: Sodium cyanide, 0.765 kilo; lead acetate, 0.15; lime, 10; zinc shavings, 0.5. The results have been so satisfactory that additional machinery for increasing the capacity has been ordered and the plant will be immediately enlarged to treat 100 tons per day.

Mine Development

The mines are being thoroughly developed by blocking out large bodies of good milling ore. The present ore supply is taken out through the Boquitas tunnel, which is a crosscut tunnel, 580 ft. in length, and cutting the ledge at 500 ft. below the surface. Sinking has been done to 500 ft. below the Boquitas tunnel, showing the ledge to a depth of 1000 ft. The Porvenir tunnel is driven a distance of 1325 ft. and will be continued a total distance of 2000 ft. to the ledge and 400 ft. below the present deepest workings. When the Porvenir tunnel is completed the entire ore supply will be taken out through it.

Improved Shaft-sinking Methods at Ducktown

Small Raises Run to Connect from Levels and the Whole Will Be Reamed out, Alined and Timbered after All Connections Are Made

BY WILLIAM YOUNG WESTERVELT *

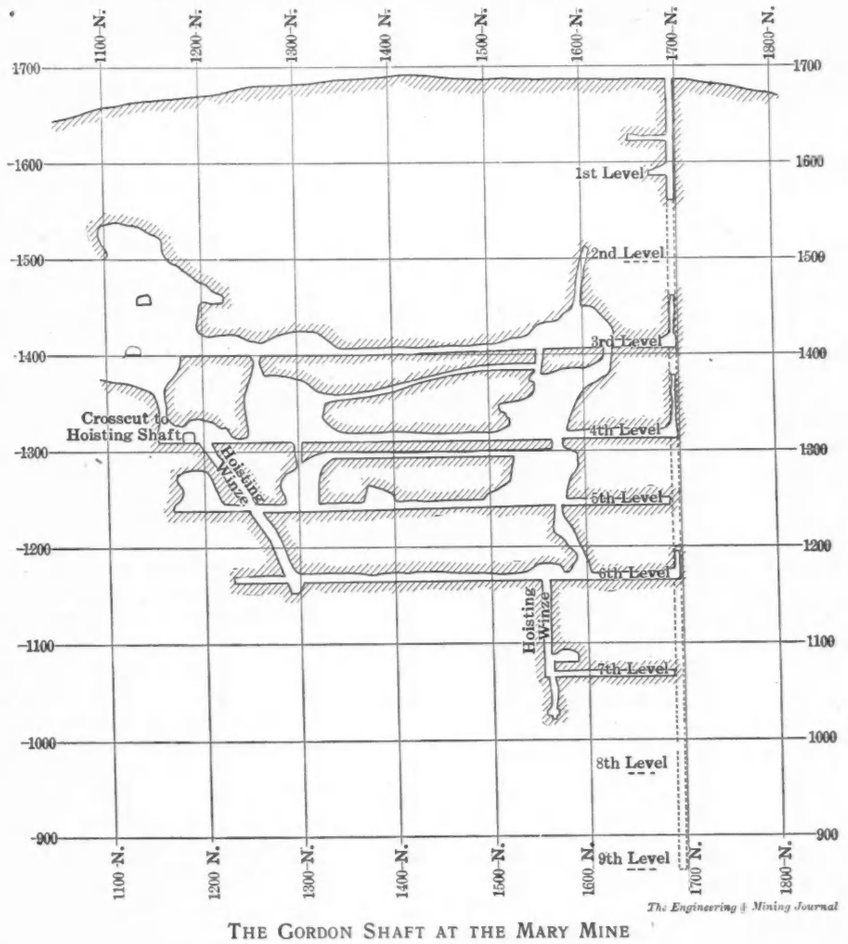
An interesting piece of shaft sinking is being carried on by the Ducktown Sulphur, Copper and Iron Company at its Mary mine near Isabella, Tenn. By means of diamond-drill holes, crosscuts and drifting work a considerable mass of ore has been proved to lie to the north and west of the main orebodies of the Mary mine and to extend from the gossan zone, less than 100 ft. below the surface, to a depth of over 800 ft. The richest ore being found in the bottom, and the limits of practical development and extraction having been reached by the indirect methods employed, it became highly desirable to sink a standard equipped shaft from the surface and to get it in operation at the earliest possible moment.

THE GORDON SHAFT

Accordingly, a new shaft, named the Gordon after the company's technical managing director, is being sunk, not only from the surface but, drifts having been run out to the location of the shaft at each of the available levels as shown in the accompanying drawing, raises are being pushed up on the center line of the shaft. These raises are being made only large enough (from 5 ft. to 6 ft. in diameter) to secure good delivery through them of broken material, and are to be reamed out to the full size of the shaft after breakthroughs have been made; this will admit of carrying plumb lines down directly from the surface work where the shaft is being sunk in the usual manner.

The surveys on which these raises are located include a traverse from the surface into the mine about 2000 ft. long and with but few long sights. Accordingly, in order to reduce possible error to a minimum, it has been gone over seven times by the company's resident engineer and finally independently checked by an outside engineer. The method of carrying the raises only 5 ft. to 6 ft. in diameter and on the center line of the shaft, however, allows for several feet of variation in location at the different levels so that no difficulty is anticipated in having the completed shaft come out true to the surface level.

The shaft consists of three compartments, two for hoisting and one for ladder and pipe lines. It is being timbered with standard-framed 12x14-in. Georgia pine, set on 5-ft. centers and having 8x10-in. dividers. The dividers are, of course, set on edge and the wall timbers flat-wise. The wall timbering is being carried down only far enough to insure complete entrance into the solid ground which is encountered immediately below the gossan zone. In the solid ground the dividers and end timbers are set in well cut hitches, such being all that is required to hold the guides, etc. In this solid ground the shaft has a cross section of 7x14 ft. and is correspondingly larger outside the timbering in the softer ground.



THE GORDON SHAFT AT THE MARY MINE

WORKING METHODS

As shown in the elevation, the construction of the shaft will be completed by working at seven different points, sinking at the top and bottom and raising from the five developed crosscuts. The sinking work carried on from the surface is being done by two crews *per diem*, each of eight men and a boss underground and a hoister and lander on top. Four 3-in. Ingersoll-Rand, reciprocating, compressed-air drills, mounted on two shaft bars, are being used in this work. The raises are being made with air-feed, hammer drills (usually two in a raise) manufactured by the Ingersoll-Rand and the Cleveland Rock Drill companies. Two men and a steel boy, with the usual complement of trammers to remove the muck as it accumulates, comprise the crew per shift employed in the raises on this underground shaft work.

The country rock at Ducktown consists of silicified mica schists, frequently remarkably tough on account of hornblende crystals present, in addition to being extremely hard so that shaft sinking is a very slow, laborious and expensive process, 30 ft. of advance per month being exception-

*Consulting mining engineer, 100 William street, New York.

ally good work in sinking. By the means adopted by the Ducktown company, however, it is expected that the shaft will be completed to the ninth level, a total depth of nearly 850 ft., in from 15 to 18 months' time, or perhaps even less. At any rate it is hoped to average around 50 ft. per month, which will be not less than double the average rate of progress which has heretofore been made in sinking to any considerable depth in the mines of the Ducktown basin. These figures consider all timbering and equipment as included. It is also expected that the method of reaming down or benching around raises will be found decidedly cheaper than that of ordinary sinking.

The top of the shaft is being raised about 15 ft. above the original surface and at this higher level the new shaft yard is to be graded. From the shaft a self-acting, inclined plane will deliver the ore across the top of the hill to the main ore bunker whence the ore is already being delivered by similar means to the 18x36-in. jaw crusher which reduces the ore to 4-in. size preparatory to its being elevated to the railroad bunkers.

Gold Mining in Russia

The gold production of Russia, as reported to the Imperial Mint—to which the law requires all gold to be delivered, is reported by our special correspondent for six years past as follows: 1903, 2302.175 poods (1 pood = 36.112 lb. Av.); 1904, 2281.825; 1905, 2016.900; 1906, 2262.475; 1907, 2314.450; 1908, 2584.750 poods. For the first half of 1909 the Mint returns show 1141.625 poods.

For a series of years the returns for the second half of the year have been much larger than for the first half, the average being 40 and 60 per cent., respectively, on the year's total. Moreover, it is usual in estimating the production to allow 10 per cent. for gold concealed, or not delivered to the Mint. Many engineers who have had experience in that country think that the allowance is too small. Estimating on that basis, however, the gold production of Russia for the year 1909 may be put at $34,160,000, a substantial increase—$3,215,000—over the preceding year. The gain was chiefly from the operations of a few companies, notably the Lena Gold Mining Company, Ltd., which reported in the first half of 1909 a total of 674 poods.

According to our correspondent's analysis, in the first half of 1909 the Ural district reported 312.600 poods of gold, or 24 per cent. of the total; the Tomsk district, or West Siberia, 140.300 poods, or 12.3 per cent.; the Irkutsk and Amur districts, West Siberia, 688 poods, or 60.3 per cent. A further analysis shows that 74 per cent. of the yield was from placers worked in the ordinary way; 4 per cent. from dredges; 0.4 per cent. from hydraulic operations; a total of 78.4 per cent. from placers. The remaining 21.6 per cent. was from quartz mines, chiefly in the Ural district; 18.9 per cent. being obtained by milling and 2.7 per cent. by cyanide and other chemical processes.

Our correspondent, in further comment, says that the increase of production does not necessarily involve an improvement in the Russian gold-mining position at the end of 1909. The gain was due chiefly to the large increase in production of three or four companies which have adopted improved methods, or which are working new districts. In fact, considering the area of ground worked, the average production has rather decreased.

The adverse conditions are most marked in the Ural district. In the Southern Ural the Kochkar system, from which brilliant results were expected in former times, has now partially failed and is making very poor returns. Some of the workings show a loss and the remainder have been supported chiefly by the lixiviation of the old tailings, which had accumulated at the mines. Some of the older mines in the Ural mountains have been worked nearly 100 years, a few 150 years, and can no longer be exploited profitably, at least by the present system. There have not been new mines enough opened to take the place of these old operations.

The most promising region in Russia is found in the basins of the Vitim and Olekma rivers in the Irkutsk province and extending over into the Yakutsk province. These goldfields are notable for their extent and for the high content of gold in the gravels. This is not only the most favored district in Russia, but it will not be far from the truth if it is claimed that the deeper placers of the region are the richest in the world. This district in West Siberia gives about one-third of the total yield of gold in Russia.

In East Siberia, in the Amur and the Seacoast districts, the gold placers already show signs of exhaustion. This is especially the case in the Amur where Blagoviestchenk, formerly the center of an important field, is now almost deserted, and other places are in the same condition. New methods of working are being tried, especially excavators and dredges, in the placers of these provinces. Besides the exhaustion of some mining districts East Siberia has suffered very much from the lack of labor. The Chinese and Koreans, who formerly worked there in large numbers, are now excluded by the government and are not allowed in the mines.

Gold dredging in Russia develops slowly, notwithstanding the number of low-grade placers where it is believed that dredges could be profitably employed. One reason for this is the lack of the capital necessary to install the machinery; another is the failure of a number of dredges, which were set at work without proper preliminary investigation of the ground, and which were not adapted to the local conditions. There are now about 60 dredges at work in the goldfields, but a number of them are operated at a loss.

We may add to our correspondent's remarks the known fact that many operators in East Siberia have been disappointed because they were unable, owing to political conditions, to extend their operations into the placers of Manchuria, south of the Amur, which are known to be richer than those on the Russian side of the boundary.

Asbestos in the Eastern Townships of Quebec

As usual the Eastern townships of Quebec supplied in 1909 practically all of the asbestos consumed in the United States. Nearly all of the mines about Thetford, Black Lake, East Broughton and Danville were active and as far as returns show made a larger production than in 1908, which was a record, and amounted to 65,157 tons of asbestos and 24,011 tons of asbestic. Considering financial conditions the asbestos business was satisfactory in 1909 and prices were fully up to the average of 1908. Inquiries and contracts from abroad also show a recovery in foreign markets.

An amalgamation of much interest was that of the Kings, Beaver, Thetford, British Canadian, Standard and Dominion mines. into a company known as the Amalgamated Asbestos Corporation Ltd. This company operated its mines and proceeded to enlarge and improve the equipment at its properties.

Uses for Asbestos Increasing

Asbestos producers are generally optimistic regarding better conditions in the industry, as new uses fo rthe mineral are continually being developed. In 1909 these developments were principally in the direction of fireproofing materials; the use of asbestos building paper between floors, etc., and the use of artificial slate and sheathing in the manufacture of which asbestos is largely used. This material was originally manufactured in Austria, but is now turned out by companies in many countries and consumed all over the world.

The textiles manufactured from long-fibred asbestos also came into more general usage. There was an increased demand for high-pressure packing and for the first time automobile brake bands made of asbestos were used.

In the laboratory of the Oriental Consolidated Mining Company in Korea, 30,591 assays were made during the last fiscal year at a cost of $6714.

The London Tin Market in 1909

The market opened firm, three months' warrants touching £134; but a speedy relapse followed on dealers' cheap purchases in eastern markets. This continued for a fortnight or so, the relapse being quickened by the realizations of disappointed speculators, the pressure of bear sales, the impending sale of Banka at the end of the month, and the prospect of unfavorable statistics following on heavy shipments from the Straits. Speculative interest, however, was in great measure diverted to copper which, in turn, was heavily depressed throughout the month: and tin suffered in sympathy. Realizations and bear sales continued to predominate until the end of the month when cash warrants were quoted at £124 7s. 6d. and £126 2s. 6d. for three months.

February found the market depressed in sympathy with copper, and holders anxious to liquidate; £123 10s. was accepted for cash warrants. Selling pressure soon ceased; but the underlying conditions were favorable enough to raise prices to £130 2s. 6d. on Feb. 11, and to keep fluctuations within narrow limits during the rest of the month.

March statistics disclosed a reduction of 1532 tons in the previous month. The market was comparatively uneventful for several days, the volume of trade being about normal, and prices moving within narrow limits. A transient improvement in American demand carried the three months' price up to £133 on March 11. By the middle of the month demand had slackened and prices fell back in sympathy with depression prevailing in surrounding markets and in view of the approaching periodical sale of Banka, three months' delivery at one moment touching £129 12s. 6d.

After touching £133 3s. 9d. for cash warrants and £134 3s. 9d. for three months, on April 7 values improved to £133 7s. 6d. and £134 10s. respectively. The highest was touched on April 20, at £134 10s. for cash, and £135 12s. 6d. for three months'.

In May the market opened with a downward tendency due to heavy bull liquidations and short sales, eastern prices being also lowered, till £130 2s. 6d. was touched for cash warrants, and £131 for three months': but this comparatively low level attracted American buyers who sent substantial orders. Speculation followed, resulting in a sharp rally to £132 12s. 6d. and £133 10s. Speculation then became rampant in tin as in copper, and the three months' price was carried up to £134 15s.

In June the market opened quietly, with eastern sellers apparently ready to meet demand, and statistics showing an increase of about 1000 tons. Three months' warrants stood at £134 10s. on April 7, from which point bears were allowed to depress the price to £133 7s. 6d. Leading operators, however, were alert to counteract this with a vigorous bull campaign which was quite in harmony with prevailing sentiment and carried the price up to £136 15s. on June 10. Closing quotations were £132 for cash warrants, and £133 12s. 6d. for three months'.

July opened with a decrease of 1084 tons in the visible supply and improved advices concerning the American tinplate industry, as well as a firmer tendency in the eastern markets. The three months' price touched £133 10s. and remained thereabout until July 7 when, in sympathy with copper, the market relapsed on bear selling and the three months' price fell to £132. The tendency during the remainder of the month was mostly upward, being largely influenced by some rather sudden purchases for American account, the highest prices being paid on July 23, when cash warrants changed hands at £135 5s., and three months' at £134 15s. On July 29 the periodical sale of Banka tin in Amsterdam disposed of 2000 tons at the average equivalent of £134 17s. 6d., but without having much effect on the London market.

The August statistics proved rather more favorable than had been expected, and the market opened with an advance of £1 10s. per ton, but promptly relapsed 10s. as a result of profit taking and the readiness of importers to meet all demand. The first week closed with cash warrants at £132 15s., and three months' at £134 7s. 6d. Trade was active, and closing prices were £139 for cash warrants, and £140 for three months'.

Disappointment was felt at the September opening by reason of the small decrease of 635 tons in the published statistics, and a sharp decline took place down to £137 2s. 6d. per ton for cash warrants, and £138 2s. 6d. for three months'. Bears became aggressive and forced down prices to £135 10s. and £137 on Sept. 8. The bull party bought largely at each decline and were thereafter successful in establishing improved values for the remainder of the month. The covering of bear commitments tended further to enhance prices which, on Sept. 28, stood at £140 10s. and £141 12s. 6d. respectively.

October, opened inauspiciously with a market vulnerable to bear attacks, and prices lowered to £138 12s. 6d. and £139 15s. At this point eastern sellers withdrew and surrounding conditions appeared more favorable, with the result that bears hastened to cover their sales and prices advanced to £140 5s. and £141 7s. 6d. respectively on Oct. 5. Then followed a relapse prompted by dearer money and depression in the market for copper. Forced realizations carried values down to £137 10s. and £138 17s. 6d. on Oct. 13, from which point they recovered by reason of improved trade demand coinciding with firmer share markets and withdrawal of offers from the East.

Market values touched £139 15s. and £141 5s. on Oct. 18. By this time the financial situation caused uneasiness, and leading operators withdrew their support; a fall of £2 per ton ensued, but was partly recovered as a result of good and steady trade with consumers.

November was a busy month throughout, with numerous fluctuations in price, but mainly upward. An initial improvement was due to a decrease of 1935 tons in the monthly statistics, followed by covering of short sales; cash and three months prices being raised to £139 10s. and £141 10s. respectively. This advance was a little too rapid to withstand the pressure of consequent realizations, and prices dropped to £138 and £140 5s.; but a good consumptive trade caused a recovery to £138 15s. and £141 by the end of the first week. The second week opened with an advance of 10s. per ton. The Banka sale comprised 2000 tons which realized the average equivalent of £141 10s. Thereafter new support induced a sharp rally, not fully maintained, but again recovered on the last day of the month, when cash warrants commanded £142 15s., and three months' £144 12s. 6d. per ton.

December found the market active and prices advancing, in spite of strenuous bear efforts and in spite of a statistical increase of 1938 tons. American demand was sufficient to outweigh all adverse factors. On Dec. 13, the market opened strong with the three months' price at £150. A reaction to £149 was only temporary, being followed by smart recovery and a further advance to £151 10s.; the week closing—after violent fluctuations—at £149 10s. for cash warrants, £150 15s. for three months'. The next week opened with a sensational advance of £4 per ton, and a turnover of about 800 tons. The advance was accomplished by leading operators who took over no large quantity on balance, but were able to work upon the prevailing bullish sentiment which gathered strength and inspired increased activity, in contrast to the quietness which prevailed in other markets with the near approach of the Christmas holidays. This advance held well until the end of the year, prices closing at the highest.

Wire Ropes in Colliery Practice

Illustrating the Various Arrangements of Pulleys and a Discussion of the Benefits Conferred by Lubricating both Winding and Hauling Ropes

BY R. H. ROWLAND*

From the earliest period to the present time, ropes have been the subject of constant interest to all concerned in the transport of minerals. There is adequate proof of this in the various interesting records of the vigorous efforts made in the early part of the last century to supply the needs of the limited mining operations being carried on at that time and now, owing to the enormous developments in depth, the considerably increased loads, extensive mining areas, and the rapid winding speeds, the needs of the present time are such as to allow for no relaxation in effort, and the subject is still of the utmost importance to the consumers, as well as to the producers. The mining engineer and the ropemaker frequently find themselves handicapped, and sometimes crippled, by restrictive limits.

Without describing the chief characteristics of the most important developments in the manufacture of wire ropes, it is my intention to make some observations on their tensile capacity, inasmuch as it is that which constitutes the most important factor for the users' consideration, and also some notes which may be of useful interest to those concerned.

The same consideration that is given to the conditions under which hoisting ropes have to work should be applied also to haulage ropes, for while the breaking of a haulage rope may not involve the same risk of loss of life as a broken winding rope, it is a fact that the haulage rope expenditure for a modern colliery is usually far in excess of the winding-rope expenditure; therefore the greatest economies are possible by having suitable ropes made to meet the conditions, rather than by the adoption of the cheapest class of rope that can be produced.

It would appear that when wire ropes became generally adopted in mining practice, they were used more freely in hauling than in winding (hoisting) operations, there being a prevalent contention that a metal rope to withstand the severe bending stresses of winding could not be constructed, and the wires must necessarily break off short. The ropes generally in use at this time were made of a soft and ductile iron wire of approximately 40 tons to the square inch, while at the present time at many mines, the hoisting ropes are made of steel wire of 160 tons to the square inch and even upward.

At a number of mines in this country the winding ropes used are of manila fiber, and at some European mines, they have gone so far as to replace steel ropes with such manila ropes. Inasmuch as the manufacture of steel wire combining very high tensile resistance is undoubtedly an art, it would appear that the replaced steel winding ropes were by no means of the best quality that could be produced, otherwise such a change would hardly be justifiable.

Wire used in the manufacture of ropes is subject to what has aptly been termed "fatigue," and this refers particularly to ropes used for winding purposes. The wear of a rope usually is caused by fatigue of the metal from bending over sheaves relatively too small. This fatigue is shown in the steady crystallization of the wires, which become brittle, and of a glassy "shortness," and although their surface may be but little worn, breakage occurs in short lengths throughout the rope. One of the most serious sources of destruction in ordinary hoisting is the injury from bending beyond the elastic limit of the wires of the rope over the small sheaves necessarily used. The number of times that the rope can be bent around a sheave before breaking will vary with the diameter of the sheave.

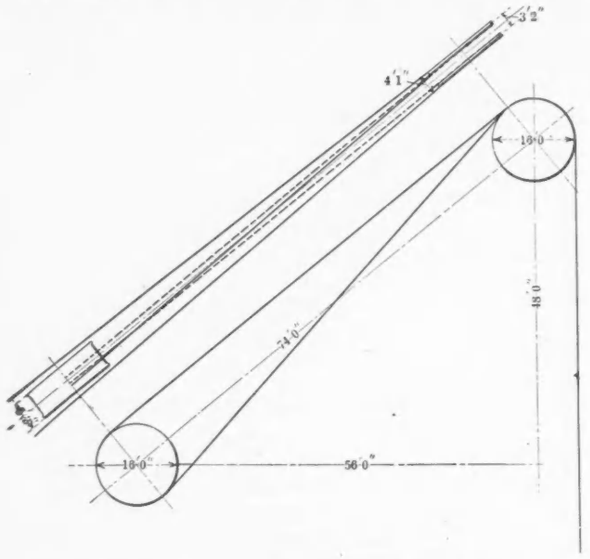


FIG. 1. SHOWING RELATIVE POSITIONS OF THE DRUM AND PULLEYS AT A SHAFT 1440 FT. DEEP

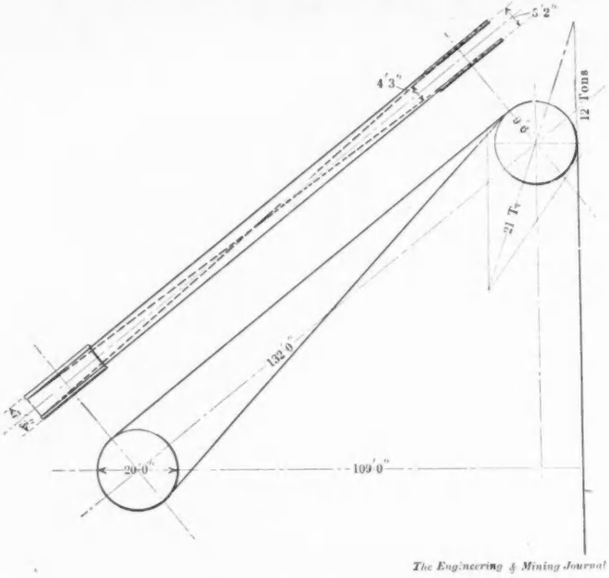


FIG. 2. WINDING ARRANGEMENT AT A PIT WHERE THE DEPTH IS 1200 FEET

INJURY TO THE ROPE INCREASES AS THE SHEAVE IS MADE SMALLER

The experiments of Andrew S. Biggart, member of the British Institute of civil engineers, show that the probable life of a wire rope ½ in. in diameter, running over a sheave 16 in. in diameter, with a load of one-tenth of the ultimate strength, would be about 160,000 bends in one direction. The injury to the rope increases very rapidly as the sheave is made smaller, and correspondingly the life of the rope increases

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rapidly as the sheave is increased in diameter. When the sheave reaches a diameter of about 100 times rope diameter, the factor of the wear so far disappears as to be negligible. If the pulleys are so arranged that the rope is bent one way on one sheave and the opposite way on the other, the life of the rope will be from one-half to two-thirds of what it would be if bent one way only.

The majority of wire-rope manufacturers appear to be now agreed that the steel adapted for winding purposes should be of as mild a quality as the factor of safety will allow. The milder grades of steel possess much greater torsional efficiency and immunity from fatigue than those of a very heavy tonnage to the square inch, however excellent in this respect the latter may be when their extraordinary tensile resistances are considered. On the other hand, however, there are many engineers who consider that winding ropes of plough-steel wire should be of the highest tensile resistance, although the shafts may be of limited depths. It would appear to me, however, that plough steel of a high tensile strain should not be adopted for winding in preference to a milder steel, unless the shaft is of such great depth that the weight of the rope itself becomes a serious item in the load; and also when the load on the rope of an existing plant has been materially increased, and the drums and sheaves cannot be altered to meet the new requirements. In this case, the same size of rope, but made of plough steel, can be used with an increase in strength from 50 to 100 per cent. In many cases, however, where an entirely new plant is being erected, after the load has been determined, a high plough-steel rope is specified to hoist it, while it would be more desirable to use a milder steel rope of slightly larger diameter, and this latter would have the longer life. The rope would naturally be heavier, but the cost in regard to the weight would be considerably less.

There are instances where all the winding plant has been originally designed for the reception of a high plough-steel rope of a certain diameter, and under this condition it would be inadvisable to alter it to suit a milder steel rope of necessarily larger diameter; but it is a fact that at various mines the winding ropes consist of high plough steel while ropes of a milder steel, and of exactly the same diameter, would give the required factor of safety.

It is a difficult matter to gather a formula which would give the breaking strains of the various types of wire ropes with accuracy, but there are various formulas for ascertaining the breaking strains of ropes composed of six strands of seven wires, each based principally on a standard weight per foot. The weight, however, varies according to the angle of lay adopted, and the results therefore can only be accepted as approximations, and cannot be applied in the case of compound ropes in which all the wires are laid in several strands. It may be taken, however, that the strength of the rope is dependent on the tensile capacity per square inch of the metal employed, the aggregate square area of the wires employed, and also upon its particular formation. The second condition, being governed largely by the third, the difficulty in laying down one formula to cover all the possible modifications will be quite obvious. As a matter of principle, however, it should be taken for granted, that the greater the number of planes the wires are laid in, the greater will be the loss in tensile efficiency.

For ropes in which the wires are laid in two planes, such as ropes above mentioned, composed of six strands of seven wires each, the breaking strain will be the aggregate sectional area of the wires multiplied by 95 per cent. of the breaking strain per square inch of the material employed, and when the wires are laid in three planes, the sectional area of the wires multiplied by 90 per cent. of the breaking strain of the material used. For every additional plane there should be allowed 5 per cent. for loss in tensile efficiency.

Regarding the breaking strain of ropes consisting of wires of sections other than round, as for instance in the locked coil, such strains are given in the various makers' tables as to make it evident that material of a lower tensile capacity is used, or that a considerable portion of the rope's section is not available for strength. For example, one maker's table gives for a 4-in. circumference plough-steel rope, a breaking strain of 90 tons. Now as the square area of a 4-in. circular rope is 1.227 sq.in., the aggregate breaking strain of 90 tons is equal to a breaking strain of 73.3 tons per square inch of the rope's sectional area. In the case of a 4-in. circumference patent-locked cast-steel hoisting rope, the breaking strain is given as 67 tons, which is equal to a breaking strain of 54.6 tons per square inch of the rope's sectional area. Under these circumstances it would be correct to assume that plough-steel ropes have a breaking strain equal to their sectional area in square inches multiplied by 73.3 and for cast-steel ropes the breaking strain is equal to their sectional area multiplied by 54.6. Moreover, let it be assumed that plough steel has a breaking strain of 110 tons per square inch, while the breaking strain of cast steel is 95 tons to the square inch; it is therefore evident that there is a loss in the tensile efficiency of 33.4

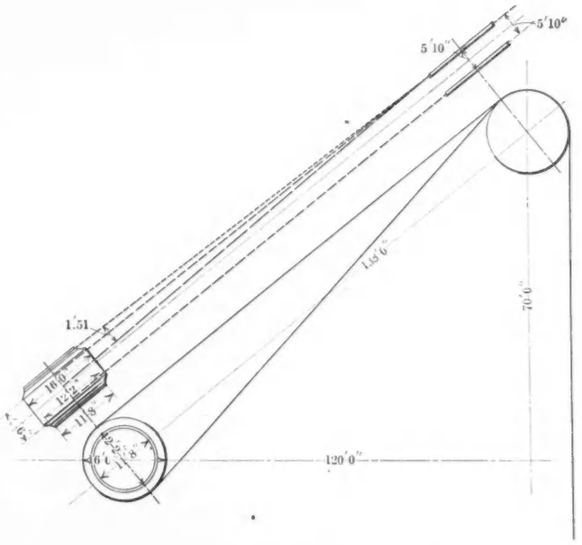

FIG. 3. WINDING ARRANGEMENT WHERE THE DRUM IS SEMI-CONICAL

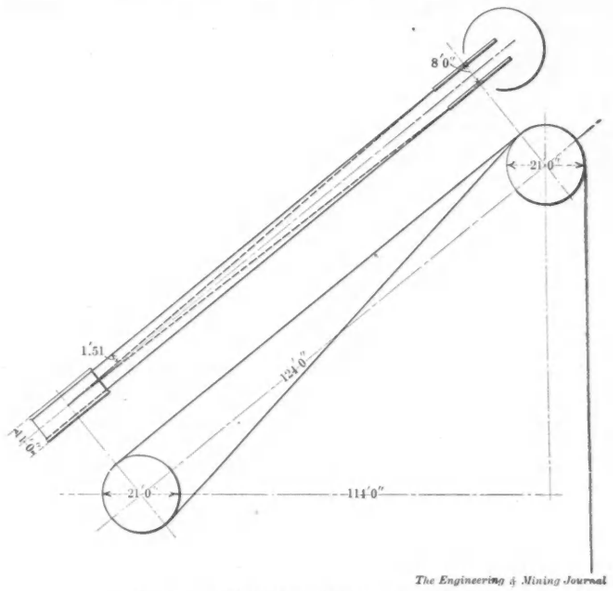

FIG. 4. WINDING ARRANGEMENT WITH PULLEYS FIXED IN PARALLEL PLANES

per cent. in the plough steel and in the cast steel of the locked-coil type, there is a loss in the tensile efficiency of 42.5 per cent. As to exactly how much of this very considerable loss is due to the fact that the wires are laid in five or six planes, in the absence of certain information, it is not easy to ascertain; there is, however, sufficient evidence to confirm the theory that the tensile efficiency of a rope decreases proportionately as the number of planes in which the wires are laid and vice versa.

Regarding the application of ropes for winding purposes, owing to the fact that there are hardly two positions alike, unless the ropemaker is acquainted with the relative positions of the drum and pulleys, etc., in each case, and recognizes the value of certain factors which affect the life of a rope, it must necessarily remain a matter of chance as to whether the rope is suitably constructed for the work required of it.

Frequently it is erroneously considered sufficient that the manufacturer shall require to know what the load will be, and the sizes of the drum and pulley, but this information gives no idea as to what the lateral angle will be, and consequently no idea of the amount of side friction which would have to be provided for. It is also important that the maker should know the distance between drum and pulley centers, and the space occupied by the rope on the drum after the wind has been completed, and any other special conditions that may be due to local circumstances. This information would enable the maker to know what the angle will be which the rope will have to traverse from the plane in which the pulley revolves, and consequently know whether the lateral friction will be normal or abnormal. It should also enable him to ascertain the length of the arc of contact with the pulley, and the amount of compression which the wires must resist in working over the pulley; and if the degree of lateral friction and the compressional force is appreciated at its true value, then the ropemaker should be able to make a rope that will give satisfaction.

Various Arrangements of Pulleys

Several methods which have been adopted to induce ropes to coil on the drum where the lead is unsatisfactory, and where the pulleys are fixed in planes which are not at right angles with the drum shaft, are shown in the illustrations. Fig. 1 shows the relative positions of the drum and pulleys at a shaft where the actual winding depth is 1440 ft. and the load is approximately eight tons. The diameter of the drum is 16 ft. and the width between flanges 6 ft. 3 in. The pulley is also 16 ft. in diameter. The diameter of the shaft only allows 3 ft. 2 in. between the ropes as they hang in the pit shaft, so that the natural plane of tension between the load in the pit shaft and the drum must be 1 ft. 7 in. from the drum center line, and unless some method were adopted to prevent it, the rope would naturally coil in that line and there would be nearly 2 ft. of coil space vacant, which of course could not be spared. To overcome this difficulty the pulleys were fixed so that they revolved in planes which were about 18 in. outside the drum altogether. They were 3 ft. 2 in. apart toward the shaft, and 4 ft. 1 in. apart towards the drum. By this arrangement the ropes were induced to coil without any loss of space, but the friction on the flange of the pulleys was so considerable that the ropes were worn out in a very short period of time.

Fig. 2 shows an arrangement at a pit where the winding depth is 1200 ft. and the load is approximately 12 tons. It will be observed that the arrangement of the pulleys is exactly opposite to the former instance. The distance between the two pulleys narrows down from 5 ft. 2 in. in the shaft to 4 ft. 3 in. toward the drum; so that they revolve in planes which are toward the drum center line, resulting in abnormal friction on pulley flange and rope.

Fig. 3 is an illustration of an arrangement where the depth is about 1350 ft. and the load is about 21 tons. The drum is semi-conical, rising in five revolutions, from 11 ft. 8 in. to 12 ft. 2 in. in diameter, then in 2½ revolutions to 16 ft. in diameter. The pulleys are 5 ft. 10 in. apart and fixed parallel to each other, and at right angles to the drum shaft. The ropes are therefore induced to coil, by metal grooves, over a distance of about 20 in. beyond the plane in which the pulley revolves. In this case it remains to be seen how long the ropes will work with safety. There can, however, be little doubt that with such a load the friction in the grooves must be very great.

Fig. 4 is an illustration of an arrangement for a pit 1800 ft. in depth, showing the economic lead, size of drum with the pulleys fixed in parallel planes at right angles to the drum shaft.

Lubrication

While the winding ropes receive every attention in the way of lubrication at most collieries, there are many instances where similar care is not bestowed on the hauling ropes, and consequently they are many times found to be running in far too dry a state. It should be borne in mind that the sole object of greasing is not only to protect the outside of a hauling rope from corrosion, but also to benefit the inside lengths of wire and to preserve the hemp core, which, if very dry, will invariably crumble away with disastrous results.

One Benefit Resulting from Lubrication

There is one benefit conferred by lubrication upon both winding and hauling ropes which is often overlooked, and that is to lessen the friction of the internal wires, which chafe heavily on each other when a loaded rope is passing over a pulley. This is one reason why the lubricating compound should be thoroughly worked into the interstices of a rope, and not applied in a meager way to the exterior. Apart from the reduction in the sectional area of the wires which this constant friction causes, and which cannot be seen unless the rope is opened out, it is believed that it also induces fatigue of the steel. It has been stated that an unlubricated wire rope stood 16,000 bends before fracture, while the same rope when lubricated stood 38,700.

Lubricating compounds which contain acids should be avoided, inasmuch as they corrode and pit the steel, and perhaps the most frequent offender is common unrefined tar, and some of the greases contain acid. Linseed oil is not to be recommended, as it is liable to harden on the wire and peel off, and this hardening may prevent the succeeding lubrication from reaching the inside of a rope. It has also a tendency to harden the hemp cores, and so effect their early destruction.

Protected Head Gears

While the protection of head gears is not practised at many of the collieries in this country, this system is adopted almost universally in most of the European countries, and is to be recommended, inasmuch as when the winding rope is idle, the cage is usually left suspended at the same place in the shaft, so that until recapped one portion of the rope is on the pulley brow and exposed to the elements, and the rope being slightly out of shape at that part, moisture more readily penetrates to its inside.

The Coal Mining Industry in Montana During 1909

The State coal mine inspector has recently submitted his report for 1909. The total output for the year is estimated at 2,541,679 tons as against 1,978,347 for 1908. This increase was due to increased production in the old mines rather than to the opening of new properties. A total of 3862 men were employed in the industry. The inspector urges the necessity for fire drills in the mines as a means of averting accidents. Legislation is urged, providing for avenues of escape from the mines when the main shaft becomes blocked, and providing for underground refuge rooms where the men may be safe from gases and floods.

Mine Rescue Stations and Mine Accidents

The Secretary of the Interior has sent the following reply to the inquiries of the Senate about mine-rescue stations and the causes of mine accidents:

"1. There have been established and are now in operation under the U. S. Geological Survey in connection with investigations as to the causes of mine explosions, for which the current appropriation is $150,000, one Federal station at Pittsburg, Penn., which is accessible to the coalfields in western Pennsylvania, northern Ohio, and northern West Virginia, and three branch stations—one at Knoxville, Tenn., accessible to the coalfields of eastern Tennessee, southeastern Kentucky, and southwestern Virginia; one at Urbana, Ill., accessible to the coalfields of Ilinois and middle western Indiana; and one at Seatle, Wash., accessible to the coalfields of the northwestern Pacific coast region. Each of these stations is supplied with such equipment as is needed by the Government experts and their assistants in entering mines immediately following disasters for investigations, and which they have used incidentally in rescuing entombed miners and in determining when and how the mine ventilation could be restored, and general rescue work carried forward by local authorities.

"At each of these four stations a mining engineer has been placed with a limited amount of equipment, including oxygen helmets, necessary for the use of himself and his assistants in entering mines in part or entirely filled with poisonous gases, as is usually the case immediately following a mine explosion. At each of these stations the mining engineer in charge has trained as volunteer assistants a limited number of young practical miners in the use of the special 'rescue' apparatus, on condition that in case of a mine disaster occurring in that region each of these would accompany the Government's expert and aid him in entering the mine immediately following the explosion for the purpose of examining into its causes and results. In carrying out this plan not only has valuable information been obtained, but a number of miners supposed to have been killed have been rescued, and subsequent explosions have been prevented, thus demonstrating beyond question or estimate the value of such work.

"The majority of the investigations into the causes of mine explosions are being conducted at the Pittsburg mine-experiment station, this being not only the greatest coal-mining center in the country, but the point nearest to the larger number of mine disasters which had occurred within a few years previous to the inauguration of this work. The work now in progress here includes researches in connection with the explosives used in mining, the nature, extent, and behavior of the gas and dust found in coal mines, and other factors which are believed to be direct or indirect causes of mine explosions.

"The investigations at Pittsburg have been supplemented as far as practicable by an examination into the local causes and attendant conditions of each of the coal-mine disasters occurring in the United States during the past year. But the long delay in reaching the majority of these mines from the Pittsburg station following the occurrence of each of these disasters was found to be a serious handicap to the success of the work. With the view to lessening this difficulty as far as practicable, the three branch stations were established.

"2. It is recommended that there be established other branch stations, fully equipped, accessible to the more important coalfields of the United States, as follows:

"(1) At some point near the boundary between southern Ohio, western West Virginia and northeastern Kentucky, readily accessible to the coalfields of each of these three regions.

"(2) At or near Birmingham, Ala., accessible to the coalfields of Alabama, southeast Tennessee and northwest Georgia.

"(3) Near the boundary between southern Indiana and western Kentucky, accessible to the coalfields of these two regions and southern Ilinois.

"(4) At some point in eastern Oklahoma or western Arkansas, accessible to the coalfields in these two States.

"(5) At some point in eastern Kansas or west central Missouri, accessible to the coalfields of these two States and central and southern Iowa.

"(6) Near Trinidad, Colo., accessible to the coalfields of New Mexico and southern and central Colorado.

"(7) At or near Salt Lake, Utah, accessible to the coalfields of Utah, western Colorado, and southern Wyoming.

"(8) At a point in southern Montana, accessible to the coalfields of Montana and northern Wyoming.

"(9) In the anthracite coalfields of Pennsylvania, accessible to these coalfields and also the northern bituminous coalfields in Pennsylvania.

"The cost of equipping and maintaining these stations during the next fiscal year is estimated as follows:

"This estimate does not include the cost of the Pittsburg station, which would be cared for in connection with the general investigations of 'mine explosions' already authorized under a separate appropriation.

Equipping nine additional branch stations, at $4300 each	$38,700
Housing for same, at $4000 each	36,000
Additional equipment and furnishing for three existing branch stations, at $3000 each	9,000
	$83,700
Maintenance for 12 months, 12 branch stations, at $6500 each	78,000
Total for equipment and maintenance	$161,700

"3. The causes of certain mine accidents have been traced with a fair degree of ease and certainty to the improper use of explosives, open lights, to faulty electric equipment, to falls of roof, to lack of discipline, etc.; but the larger mine disasters, involving gas or dust, or both, are still little understood, notwithstanding the investigations under way in this and other countries. Unfortunately in most such cases those who might have thrown light on the initial causes have not survived the disaster. In all cases the development of satisfactory preventive measures is still more difficult, and in this country has been long neglected, though equally deserving of inquiry and research of the widest scope and most thorough character.

"The urgency of this work is further emphasized by the fact that as our coal mines are becoming deeper the gas is becoming more abundant and the mines correspondingly more dangerous. The number of such disasters and the loss of life have been for some years steadily increasing. Furthermore, disasters have been occurring in regions where they were least expected and in the 'safest' mines.

"The investigations authorized by Congress as to the 'causes of mine explosions' are now under way, and the facts already developed are such as to encourage the belief that means of lessening disasters from such causes will be in hand in the near future.

"Under the wording of the current appropriation the mine investigations are limited to 'mine explosions,' which are generally responsible for less than 15 per cent. of our mine fatalities. The benefits that may reasonably be expected from this expenditure will be doubtless largely increased if its scope be widened to include also the causes and prevention of other 'mine accidents.' Furthermore, in view of the exceptionally dangerous character of the work as well as its importance and the difficulty in securing the services of suitably trained experts, it seems proper that the investigation work on mine accidents should be placed on as permanent basis as possible.

"As to the action that the Federal Government should take to prevent or at least

minimize mine accidents, it is assumed that in mining, as in agriculture, the function of the Federal Government is strictly limited to research and educational or demonstration work, and, therefore, its function in relation to safeguarding the lives of miners must be limited to investigations of the causes and means of preventing mine accidents, developing methods of rescue work, and enough of demonstration or educational work to induce mine operators and miners to adopt these measures, under State supervision, and to lead the States to enact more uniform mining regulations.

"It is on this basis that the additional branch stations described above are recommended. It is believed that they will be adequate for the purposes named and that the work of these stations will be sufficient to induce coal operators and coal-mining States to ultimately establish a sufficient number of small local stations for ordinary rescue work.

"Meanwhile at each existing station, along with researches to develop causes and preventive measures, every effort is being made, and with reasonable expectation of success, to find ways of cheapening the cost of rescue equipment and methods, with a view to their more general introduction by States and individual operators.

"It is, therefore, reasonable to expect that, as progress is made in the investigation and demonstration work at these several branch stations of the Federal Government, preventive rather than rescue measures will increase in importance; that most of these Federal stations can then be discontinued, and that whatever rescue work may prove necessary will, like the enforcement of preventive measures, be fully cared for by local and State authorities.

"Conditions involving mine safety are more uniform than are agricultural conditions, being less influenced by climatic changes. Hence these mine investigations and inquiries, though conducted at these few stations, are of value to the people of all the States, and this value is increased by the fact that the experts of the Federal Government collecting data from all the States and the various foreign mining countries bring to these problems in each State the results of this wider experience and method, with minimum duplication of cost and effort. Fortunately in most of the States the larger mine disasters occur so rarely that several years may intervene without opportunity for mine examinations or rescue work under complicated conditions; and in such cases especially experts from the Federal investigation stations would be able to render special service to the State authorities by virtue of their more frequent and wider experience under equally complicated conditions in other portions of the country."

Connellsville Coke Wages

A new scale of wages for the Connellsville and lower Connellsville region was posted Jan. 10 by the H. C. Frick Coke Company, the coke subsidiary of the United States Steel Corporation, to become effective Jan. 16. As usual, the new scale will be adopted by the independent operators in the region. The new scale restores the basis of $1.35 for mining and loading 100 bu. room and rib coal, which was the basis of the scale in force for a portion of 1903 and again for a portion of 1907, the scale since then having been based on $1.20. Several minor jobs are advanced slightly above the 1907 basis, while very few are placed below it. At the usual rough estimate of one man per oven, the advance affects about 35,000 men, 20,000 of the steel corporation and 15,000 of the independents.

The old high scale, the intermediate scale, and the new scale, are given in full below, with the dates of their becoming effective:

WAGE SCALES, CONNELLSVILLE REGION.

	Mar. 1. 1907.	Jan. 1. 1908.	Jan. 16. 1910.
Mining and loading room and rib coal, 100 bu	$1.35	$1.20	$1.35
Mining and loading heading coal, per 100 bu	1.50	1.38	1.50
Mining and loading wet heading coal, 100 bu	1.60	1.50	1.62
Drawing coke, per 100 bu. charged	0.77	0.70	0.78
Drivers and rope riders (shafts and slopes)	2.55	2.40	2.60
Drivers and rope riders (drift) per full run	2.45	2.30	2.55
Cagers, per full run	2.55	2.40	2.60
Tracklayers, blasters and timbermen (shafts and slopes) per day	2.55	2.40	2.60
Tracklayers, blasters and timbermen (drifts) per day	2.45	2.30	2.55
Assistant tracklayers and inside laborers per day	1.95	1.75	2 00
Dumpers and tippiemen, per full run	1.95	1.80	2.00
Leveling, per oven	0.12½	0.11½	0.12½
Chargers, per oven	0.04½	0.04½	0.04½
Chargers, per day	2.00	1.85	2.00
Forking cars, 40,000 lb. capacity and less	1.65	1.50	1.65
Forking cars, 50,000 and 60,000 lb. capacity	1.75	1.60	1.75
Forking cars, over 60,000 lb. capacity	1.90	1.75	1.90

The different scales which have been in force in the region, showing the dates effective and the rate for mining and loading 100 bu. room and rib coal, have been as follows:

	Mining.
February 10, 1894	$0.78
April 1, 1895	0.90
October 1, 1895	0.954
January 1, 1896	1.05
April 29, 1899	1.12½
March 1, 1900	1.25
January 1, 1903	1.35
December 16, 1903	1.10
March 1, 1905	1.20
March 1, 1907	1.35
January 1, 1908	1.20
January 16, 1910	1.35

Colliery Notes

Recent experiments have proved conclusively that coal dust which has been ground to a state so fine that it will pass a 200-mesh sieve, will explode from contact with either a naked flame or with the arc of an electric current.

The deepest coal seams mined in America lie above a depth of 2200 ft.; some of the coal mines in England are developing seams at a depth of 3600 ft., while coal mining is carried on at a depth of about 4000 ft. in Belgium.

Mr. Fisher, of the U. S. Geological Survey, says: "Few coals less than 14 in. thick are mined in a commercial way in the United States, but beds only 8 in. thick are mined commercially abroad. The first English Royal Commission on coal supplies in 1871, fixed 12 in. as the minimum workable thickness, however, many separate beds 8 and 10 in. thick are now worked commercially in England."

A safety lamp for detecting small percentages of firedamp without lowering the flame of the lamp, has been invented by two English engineers. The inventors recently gave a demonstration with the new lamp, showing how the introduction of sodium carbonate into the flame—by means of a piece of asbestos saturated with it—converted the blue cap, produced by gas, into a bright yellow flame, without lowering the lamp flame.

The production of coal in Canada in 1874 was 1,063,742 tons; it took 12 years' of growth to double this annual production, and in 1886 the coal output totaled 2,116,653 tons; in 1898 the production was 4,173,108 tons; in 1904, the production was 8,254,595 tons. In the four years following 1904, the Canadian coal output increased only about 2,000,000 tons, but present indications confirm the belief that the future production will increase at a more rapid pace than it has in the past, and that before a great while, Canada will be able to supply all her own fuel and have coal left for export.

Until a few years ago, all public coal lands were valued uniformly at a rate of $20 or $10 an acre, according if they lie less or more than 15 miles from a railroad. Since July, 1906, the Government has been appraising its coal land according to the value of its contained coal. The present value fixed for the Government coal land, based on the new regulation, is $149,772,443; the value fixed for these same coal lands before the new classification was adopted was $48,240,971. According to these figures, it is evident, therefore, that if these lands had been sold at the prices prevailing before July, 1906, they would have brought the Government about $100,000,000 less than their value at the prices now fixed.

MINING AND METALLURGICAL PATENTS

A CLASSIFIED LIST OF NEW INVENTIONS

A copy of the specifications of any of these patents issued by the United States Patent Office will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. British patents are supplied at 40 cents. In ordering specifications, correspondents are requested to give the number, name of inventor and date of issue.

ALUMINUM

SOLDER—Aluminum Solder. John Wirgovits, New York, N. Y., assignor, by direct and mesne assignments, of one-third to Henry Heller and one-third to Glenn M. Smith, New York, N. Y. (U. S. No. 941,835; Nov. 30, 1909.)

COAL AND COKE

COAL DUST—Apparatus for Exhausting Coal Dust from Coal Breakers. Walter S. Carpenter, Wilkes-Barre, Penn., assignor of one-third to Benjamin Harold Carpenter and one-third to Edmund N. Carpenter, Wilkes-Barre, Penn. (U. S. No. 945,375; Jan. 4, 1910.)

COAL-MINING MACHINE. Arthur H. Gibson, Easton, Penn., assignor to the Ingersoll-Sergeant Drill Company, New York, N. Y., a Corporation of West Virginia. (U. S. No. 944,029; Dec. 21, 1909.)

COKE OVEN—Vertical-Flue Coke Oven. Carl Wilke, Sheffield, England, assignor to Simon-Carves Bye-Product Coke Oven Construction and Working Co., Ltd., Manchester, England. (U. S. No. 946,181; Jan. 1, 1910.)

COKE OVENS—Improvements in or Relating to Coke Ovens. A. O. Jones, Whitley Bay, Northumberland. (Brit. No. 15,078 of 1909.)

COKE OVENS—Method of Preventing the Destruction of Coke Oven Walls through the Alkalies Contained in the Charge. Heinrich Koppers, Essen-on-the-Ruhr, Germany. (U. S. No. 945,331; Jan. 4, 1910.)

COAL-CUTTING MACHINES—Dust Preventive Attachment for Coal-Cutting Machines. Arthur E. Wood, Charleston, W. Va. (Brit. No. 8727 of 1909.)

EXPLOSIONS — A Novel or Improved Method of Preventing Explosions of Coal Dust, Inflammable Gas and the Estimation of Underground Fires in Coal or Other Mines. T. W. D. Gregory, Stoke-on-Trent. (Brit. No. 25,329 of 1908.)

HOISTING—Improvements in Connection with Winding Engines for Collieries or the Like Purposes. A. J. Worth and Messrs. Worth, Mackenzie & Co., Ltd., Stockton-on-Tees. (Brit. No. 18,147 of 1908.)

SAFETY LAMPS—Improvements in or Applicable to Miners' Safety Lamps. Joseph Prestwich, Eccles, Lancaster. (Brit. No. 5158 of 1909.)

SAFETY LAMPS—Improvements in or Relating to Miners' Safety Lamps. John C. Best, and Maxwell Best, Morley, Yorkshire. (Brit. No. 4001 of 1909.)

WASHING — Method of Washing Coal. James R. Campbell, Scottdale, Penn. (U. S. No. 945,692; Jan. 4, 1910.)

COPPER

CONVERTER—Metallurgic Converter. William H. Peirce, Baltimore, Md. (U. S. No. 944,905; Dec. 28, 1909.)

EXTRACTION FROM RESIDUES — Improved Process for Extracting Copper from Copper Residues. D. Crispo, Antwerp, Belgium. (Brit. No. 12,565 of 1909.)

ORE TREATMENT—Improvements in the Treatment of Copper and Other Ores. F. B. Dick, Sunbury, England. (Brit. No. 16,667 of 1908.)

SMELTING FURNACES—Improvements in Furnaces for the Smelting of Ores, Residues and the Like for the Obtainment of Copper or Other Metals Therefrom. B. de Saint Seine, Paris, France, and Thwaites Bros., Ltd., Bradford, England. (Brit. No. 23,179 of 1908.)

GOLD AND SILVER

AMALGAMATOR. Charles R. Hotchkiss, Oakland, Cal., assignor of one-half to George S. Montgomery, Oakland, Cal. (U. S. No. 945,539; Jan. 4, 1910.)

IRON AND STEEL

BLAST-PIPE for Blast Furnaces. Samuel B. Shutts and William McHugh, Joliet, Ill. (U. S. No. 946,404; Jan. 11, 1910.)

DIRECT PRODUCTION—Improvements in and Relating to the Direct Production of Iron from Its Oxides or Oxide Ores. W. S. Simpson and H. Oviatt, London, S. W. (Brit. No. 24,846 of 1908.)

DIRECT PRODUCTION—Improvements in Connection with the Direct Production of Steel or Steel Alloys from the Ore. W. S. Simpson and H. Oviatt, London, S. W. (Brit. No. 24,845 of 1909.)

NODULIZING—Method of Disintegrating and Removing Annular Salamanders in Nodulizing Kilns. August Bräutigam, South Orange, N. J., assignor to August Heckscher, New York, N. Y. (U. S. No. 13,062, reissue; Dec. 28, 1909.)

SLAG CEMENT—Improvements in Machines for the Treatment of Blast Furnace Slag in the Manufacture of Cement. G. F. Metzger, Manchester. (Brit. No. 15,165 of 1909.)

TITANIFEROUS ORES—Improvements in or Relating to a Process of Treating Titaniferous Iron Ores. Wilhelm Borchers, Aix-la-Chapelle, Germany. (Brit. No. 24,590 of 1909.)

LEAD

LEAD OXIDES—Improvements in the Manufacture of Certain Lead Oxides. G. V. Barton, Liverpool. (Brit. No. 4465 of 1909.)

SULPHUR AND PYRITES

PYRITE ASHES—Improvements in or Relating to the Treatment of Pyrite Ashes. A. Pezzolato, Rome, Italy. (Brit. No. 11,263 of 1909.)

TIN

DETINNING—Process of Treating Detinned Iron and Residues. William W. Murray, Baltimore, Md., and Harry M. Fernberger, Philadelphia, Penn. (U. S. No. 943,986; Dec. 21, 1909.)

ZINC

ELECTRIC FURNACE—Electric Furnace for the Continuous Extraction of Zinc from its Ores. Eugène F. Cote and Paul R. Pierron, Lyon, France. (U. S. No. 944,774; Dec. 28, 1909.)

EXTRACTION PROCESSES — Improvements in or Relating to Apparatus for Use in Solution and Precipitation Processes and Particularly for the Extraction of Zinc from Its Ores or Compounds. W. Hommel and the Metal Extraction Corporation, Ltd., London, England. (Brit. No. 26,152 of 1908.)

MINING—GENERAL

GASES—Apparatus for Testing Mine Gases. Joseph Smith, Trinidad, Colo. (U. S. No. 944,247; Dec. 21, 1909.)

GASES—Improved Means for Detecting the Presence of Gas in Mines or the Like. (Brit. No. 525 of 1909.)

HOISTING—Improvements in Apparatus for Preventing the Overwinding of Cages in Mines or the Like. H. D. Bayley, Beeston, and B. Froggatt, Bulwell. (Brit. No. 5273 of 1909.)

PROPS—Improvements in and Relating to Mining Props. F. Sommer, Essen Ruhr, Germany. (Brit. No. 24,347 of 1908.)

PROPS—Improvements in Mining Props. J. H. Eickershoff, Düsseldorf, Germany. (Brit. No. 14,962 of 1909.)

SAFETY ATTACHMENT for Hoisting Engines. Augustus L. Le Grand, West Pittston, Penn. (U. S. No. 946,236; Jan. 11, 1910.)

SIGNALING—Improvements in Apparatus for Electric Signaling in Connection with Mine Haulage and Winding or Operations of a Similar Nature. Robert Rutherford, Ferryhill, Durham. (Brit. No. 21,693 of 1908.)

SURVEYING—Mining-Transit-Center Finder. William A. Berger, Boston, Mass. (U. S. No. 944,654; Dec. 28, 1909.)

THAWING DEVICE for Frozen Ground. Walter T. Ross, Vancouver, British Columbia, Canada. (U. S. No. 944,382; Dec. 28, 1909.)

ORE DRESSING—GENERAL

MAGNETIC ORE SEPARATOR. G. E. Oehrn, New York, N. Y., assignor to American Grondal Kjellin Co., New York. (U. S. No. 946,395; Jan. 11, 1909.)

MAGNETIC SEPARATOR. Sheldon Norton, Mineville, N. Y. (U. S. No. 945,408; Jan. 4, 1910.)

ORE-CONCENTRATING TABLE. Thomas W. Scott, Morenci, Ariz. (U. S. No. 944,917; Dec. 28, 1909.)

ORE FEEDER—Improved Automatic Ore Feeder for Stamps or the Like. John H. Thomas, Bodmin, Cornwall. (Brit. No. 3867 of 1909.)

ORE SEPARATOR. Frederick T. Snyder, Chicago, Ill., assignor to International Separator Company, Chicago, Ill., a Corporation of New Jersey. (U. S. No. 944,699; Dec. 28, 1909.)

ORE TREATMENT—Improvements Relating to the Treatment of Ores of the Like. A. A. Lockwood and M. R. Anthony Samuel, London. (Brit. No. 16,229 of 1909.)

ORE TREATMENT—Process for the Treatment of Minerals for the Extraction of the Metal which They Contain. Buenaventura Junguera of Santa Susana, Oviedo, Spain. (Brit. No. 21,837 of 1908.)

PEBBLE-MILL. Max F. Abbé, New York. (U. S. No. 944,996 and 944,997; Dec. 28, 1909.)

SCREENING—Improvements in or Relating to Machinery for Screening Crushed Stone, Ore and Like Materials. W. H. Baxter, Leeds. (Brit. No. 19,586 of 1909.)

SEPARATION—Improvements in Means for Separating Crushed Ore Products or Other Comminuted Matter from Solid. A. F. Arbuckle, and A. Osborne, Belgravia, near Johannesburg, Transvaal. (Brit. No. 27,767 of 1908.)

STAMP MILLING—Ore-Stamp-Mill Mortar. Peter N. Nissen, Los Angeles, Cal., assignor to the Nissen Engineering Co., a Corporation of Arizona. (U. S. No. 945,135; Jan. 4, 1910.)

VANNER. Daniel K. Allison, Milwaukee, Wis., assignor to Allis-Chalmers Co., Milwaukee, Wis., a Corporation of New Jersey. (U. S. No. 945,300; Jan. 4, 1910.)

METALLURGY—GENERAL

CHARGING FURNACES—Improved Means for Charging Roasting and Other Furnaces. Utley Wedge, Ardmore, Penn. (Brit. No. 12,766 of 1909.)

COMPLEX ORE TREATMENT — Improvements in Obtaining Zinc and Copper from Complex Ores or the Like. John Richard Williams, Henry Wentworth and Benjamin Bradley, Sheffield, Eng. (Brit. No. 26,711 of 1908.)

DESICCATION OF AIR—Improvements in the Desiccation of Air for Metallurgical Operations. Louis Sterne, London. (Brit. No. 23,529 of 1908.)

FLUE DUST—Process of Reclaiming or Recovering Values from Dust. Nathan H. Livingston, Globe, Ariz. (U. S. No. 943,752; Dec. 21, 1909.)

FURNACES—Improvements in Regenerative and Reverberatory Furnaces. Oskar Friedrich, Bobrek, Upper Silesia, Germany. (Brit. No. 6561 of 1909.)

LIXIVIATION PROCESSES—Improvements in the Arrangement and Construction of Appliances Employed in Lixiviation Processes for the Extraction of Metals. James Williams, London, Eng. (Brit. No. 26,831 of 1908.)

ORE ROASTING FURNACE. Benjamin Hall, Nevada City, Cal. (U. S. No. 945,522; Jan. 4, 1910.)

POWDERED COAL—Method of Burning Powdered Coal. Louis S. Hughes, Joplin, Mo. (U. S. No. 945,846; Jan. 11, 1910.)

RECOVERY FROM SCRAP—Apparatus for Recovering Material from Scrap Metal. Solomon W. Egbert, Joliet, Ill. (U. S. No. 945,024; Jan. 4, 1910.)

SMELTER SMOKE—Improved Method of Treating Corrosive Gaseous Fumes or Smoke. Clarence B. Sprague, Salt Lake City, Utah. (Brit. No. 26,684 of 1908.)

Personal

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

John Mason Boutwell was married at Lawrenceville, N. J., Jan. 22, to Miss Esther Miner.

E. P. Merrill, formerly manager of the Real del Monte y Pachuca Company in Mexico, is in New York.

A. G. McKenna, of Washington, D. C., has been looking over interests in the Nederland district, Boulder county, Colorado.

J. Parke Channing will start for the West next week. He expects to be absent from New York for two or three months.

J. W. Flanagan, president Buena Fe Mining Company, Ojuelos, Jalisco, Mexico, has just returned to the mine from Houston, Texas.

M. W. Mouatt, general manager of the Bellevue-Hudson mines at Georgetown, Colo., has left for Mexico to make an examination of a mine.

Pope Yeatman will leave New York next week for Chile. He expects to examine the Braden copper mines, and will be gone about 75 days.

M. Sidney, manager of the East Argentine Mining Company and Commonwealth Power Company in Summit county, Colo., is on a business trip to the East.

C. H. Repath, chief engineer of the International Smelting and Refining Company, recently lectured before the mining students of the University of Utah.

E. J. Schrader, superintendent of the San Miguel Gold Mining Company, Sonora, Mexico, has been examining the old Mexicana mine near Querobabi, Sonora.

S. W. Eccles, vice-president of the American Smelting and Refining Company, left New York recently on his annual tour of inspection of Mexican properties.

J. J. Kennedy, formerly with the Shenango Furnace Company at Chisholm, Minn., is now with the San Miguel Gold Mining Company at La Palma, Sonora, Mexico.

R. B. Lamb, of the C. L. Constant Company, has returned from a professional trip to Ontario, and has left New York for Central America on important examinations.

John C. Greenway has returned from New York to Coleraine, Minn., and has resumed his work as superintendent of the Canisteo district of the Oliver Iron Mining Company.

Richard M. Atwater, Jr., has been appointed consulting engineer of the Boston & Alta Copper Company. Mr. Atwater is also consulting engineer and manager of the Butte & Superior.

John Moreland, of San Antonio, Texas, general manager of the San Jose Mining Company, at Charcos, San Luis Potosi, Mexico, is visiting the mine, where operations have just been resumed.

S. A. Richards has resigned his position as manager of the Struthers Furnace Company, Struthers, O., after 50 years spent in the iron industry, 30 of them being with Struthers furnace.

M. W. Head, formerly treasurer of the Jamison Coal and Coke Company, Pittsburg, is now general superintendent of the company's West Virginia plant, with an office in Fairmount, W. Va.

J. B. Tyrrell, of Toronto, Ont., is delivering a short series of lectures on "The Structure and Origin of Placer Gold Deposits" to the more advanced students of mining at McGill University, Montreal.

Dr. E. G. Acheson has been awarded the Perkin gold medal of the American Electrochemical Society. The presentation was made Jan. 21 at a meeting held in the rooms of the Chemists' Club, New York.

M. J. Butler, recently deputy minister of the Railway Department of the Dominion of Canada, has been chosen vice-president and general manager of the Dominion Steel and the Dominion Coal companies.

W. B. Allen, of Birmingham, Ala., manager of the Land Department of the Tennessee Coal, Iron and Railroad Company, who has been in bad health for several months, has gone to Johns Hopkins Hospital at Baltimore.

J. E. Edwards has returned to Colorado Springs, Colo,, from Mexico City, where he has been planning the new testing plant for the British Mexican Development Company, of which H Lawrence Read is manager.

Dr. Frederick N. Pease, of Altoona, Penn., has been appointed chief chemist of the Pennsylvania Railroad Company, to succeed the late Dr. C. B. Dudley. He had served under Dr. Dudley in various capacities for 28 years.

Alexander Dempster, recently chairman of the executive committee, has been chosen president of the Monongahela River Consolidated Coal and Coke Company. George W. Theiss, late president, becomes vice-president.

Arthur Yates has been appointed general manager of the Ketahoen mine in Sumatra, for the firm of Erdmann & Sielcken, which owns the Redpang-Lebong, the Lebong-Siman, the Ketahoen and other gold and silver mines in Sumatra.

F. A. Glass will engage in the general practice of mining engineering at Brainerd, Minn. He has been recently with the Duluth Diamond Drilling Company, and with the Rogers Brown Ore Company at the Kennedy, the first producing mine on the Cuyuna range.

Robert H. Plate, superintendent of the Copper Mines Company at Ely, Nev., and who has also looked after other Gunn-Thompson properties at Ely, has resigned and is now in New York. Mr. Plate's work at Ely will be taken over by Arthur Smith of the Ely Securities Company.

Obituary

J. W. Fuller, a director of the Empire Steel and Iron Company, owner of the Lehigh Carwheel and Axle Company, and one of the best known iron and steel men in the eastern Pennsylvania district, died Jan. 14, at Catasauqua, Penn., after a very short illness.

Harold A. Wiley died in Toronto, Ont., Jan. 15, aged 51 years. He was for many years prominent in mining affairs in the Port Arthur district, where he held large interests, and was also interested in the earlier development at Cobalt. He was president of the Canada North-West Steamship Company.

Harvey A. Shipman died at Denver, Colo., Jan. 3, aged 55 years. He was born and educated in Wisconsin, and went to California as a young man, beginning work there as a mining engineer, For several years he had charge of the management of the Searles properties. In 1899 he was called to Colorado to take charge of the Stratton's Independence. He stayed there three years and then went to Australia. In 1905 he returned to Denver and took up general consulting work. A year ago he went to West Africa and it was then he contracted the fever which eventually led to his death.

Societies and Technical Schools

American Mining Congress—The proceedings of the Goldfield convention have been published. A circular from the secretary says: "Our province is essentially one of agitation; being without power to command the enactment of these reforms, our only course is to educate the public and legislative bodies to the necessity of giving due consideration to the demands for various reforms made by the congress. As one of the means of increasing the effectiveness of this organization, we will soon begin issuing a monthly journal devoted to the advocacy of these principles, the columns of which will be open to all members for purposes of discussion. We are planning also the holding of monthly meetings of the branch organizations at which questions either of a local or general nature will be discussed. There are now seven branches of the Mining Congress; others are in process of formation, and we hope soon that every important mining center will have its own local branch."

EDITORIAL CORRESPONDENCE

REPORTS FROM OUR OWN REPRESENTATIVES ON IMPORTANT EVENTS FROM MANY IMPORTANT MINING CENTERS OF THE WORLD

San Francisco

Jan. 21—In the Nevada City district, the Champion mines have been important producers and when in full operation, gave employment to hundreds of men. These mines were bonded to an English syndicate after the lawsuit with the adjoining Home mine, but the bond was not exercised. Recently an entirely new vein was encountered on the 800-ft. level of the Champion, which is said to mill $30 per ton and is the greatest strike in this group for years. In the same district, near the Idaho-Maryland, the Nassau (formerly the Dana) is sinking a double-compartment shaft which is down 350 ft. Electric power is used in hoisting and the shaft is being deepened 4 ft. per day with machine drills. The Pittsburg-Gold Flat Mines Company was organized in 1908 to take over the Pittsburg, Gold Flat and Potosi mines. The property is now being actively opened up. Electric power has been installed operating all the machinery. The Pittsburg mill is equipped with 10 stamps and four vanners and is crushing ore night and day. Good rock has been found in the north drifts of the 900- and 1000-ft. levels of the Pittsburg with considerable unstoped ground above these levels. A contract has been let to sink the Pittsburg shaft 140 ft. deeper. This mine is credited with a production in excess of $1,000,000, previous to 1900.

In the Union Hill mine near Grass Valley, the Greek vein has been struck on the 600-ft. level and shows good ore.

Jan. 10 was the best pay-day that the little town of Kennett ever saw; on that day, the Mammoth Copper Company disbursed $80,000 to its employees. The county ordinance prohibiting gambling has been strictly observed, and in consequence the men have paid their bills more promptly than in the past and a good many of them have deposits in banks.

Extending in a north-south direction through Sierra county, there is a belt of amphibolite-schist, flanked and penetrated by serpentine dikes, that is notable for the number of quartz veins it contains, that are rich in coarse gold and high-grade arsenical sulphides. The most noted camp is Alleghany, where are located the Tightener, Eldorado, Sixteen-to-one, and Rainbow mines with their phenomenal pockets of gold ore. These mines are in the green amphibolite-schist and not at serpentine contacts as frequently stated, although serpentine dikes occur near by. Across the cañon of the North Yuba to the west and north of Downieville are other similar deposits, although none have been found as rich as those at Alleghany. This section has had, however, less persistent prospecting. At the Standard mine in Sailor ravine, four miles north of Downieville, there is little coarse gold but the arsenical sulphides are rich, a recent shipment assaying $1650 per ton of concentrates. The country rock is here also an amphibolite-schist or greenstone, but there is serpentine 200 ft. to the west. This mine, operated by Frye & Winrod, shows a distinct shoot of the arsenopyrite ore, and not a pocket.

W. P. Hammon and others have bonded 7000 acres, 7 miles north of Redding, near the mouth of Clear Creek at $100 per acre, for dredging purposes. Water rights have been secured on Hat creek and Brown lake.

Articles of incorporation were filed at Fresno Jan. 8, by the American Oil Fields Company, having a capitalization of $25,000,000. It is understood that the incorporation of this company will consolidate interests controlling thousands of acres in the Coalinga field.

Butte

Jan. 21—The city council of Butte is acting with deliberation upon the petition of the Davis-Daly company for permission to run an electric tramway from the Colorado mine through the streets to the Great Northern railway. In response to a request of the street and alley committee of the council for an opinion on the legality of the proposed grant the city attorney has rendered his opinion to the effect that the council may safely give its permission without submitting the question to the taxpayers since the permission would amount merely to a license and not a franchise. It is probable, however, that the council will act upon the matter shortly. Until then the shipments will not be begun.

At the annual stockholders' meeting of the Butte & Superior Copper Company, held in Duluth, the following were elected directors: J. B. Becher, A. M. Chisholm, A. B. Wolvin, William White, I. Freimuth, J. G. Williams and John S. Killorin, of Duluth, and H. S. Clark, of Butte.

The Big Blackfoot Railway Company, capitalized for $250,000, and having its principal place of business at Missoula, has filed its articles. Its original board of directors is named as follows: John Gillie, L. O. Evans and C. F. Kelley, of Butte, and John R. Toole and Kenneth Ross, of Missoula. The road will extend from some point on the Big Blackfoot river in a northeasterly direction to the north end of Powell county. The country tapped by the railway is well timbered and contains some promising mines. The Big Blackfoot Milling Company is one of the Amalgamated subsidiary companies and is backed by the same interests, so it is probable that the primary object of the new railway is to transport lumber for the milling company.

The State Railway Commission, by its letter to the Montana, Wyoming & Southern railway, has indicated that unless that company takes some action to furnish more cars for the use of the Bear Creek coal district it will take steps to make that company do so. During the periods of intense cold, so frequent in Montana winters, the coal supply is a matter of vital importance to the people of the State, and the commission is empowered under the law to compel railway companies operating in the State to furnish sufficient service, both freight and passenger. The fact that there has been a coal shortage has been due in some measure to the lack of sufficient motive power on the Montana, Wyoming & Southern railway which taps the Bear Creek coalfields. These fields are at present offering the railway considerably more coal than it can handle.

In a statement issued by F. A. Heinze to the holders of La France Copper Company bonds, it appears that the company is unable to meet the interest which was due on those bonds Jan. 1, 1910. An offer is made to give the company's notes for the interest due, these notes being payable six months after the coupons fall due and bearing interest at the rate of 6 per cent. The company's Lexington mine has not been in operation for a number of months and this is the cause of its inability to meet the interest on its bonded indebtedness. The ores of the Lexington are chiefly valuable for their zinc content, and since the Basin concentrator, also controlled by the same interests, is being put in readiness to operate at its full capacity and is now treating zinc ore for the Butte & Superior company, it is possible that the

Lexington may soon be started up and its ores also shipped to Basin.

Denver

Jan. 23—From that prolific center of mining sensation and high finance, Colorado Springs, comes the startling story, wisely prefixed with an "if the claims of the Apex Copper Company are true," that a district 50 miles west of the above town, near Lake George, "comprises the richest goldfields on the American continent, which will make the entire output of Cripple Creek, Leadville and Alaska a mere bagatelle," etc., *ad nauseam*. It is stated that a drift has been run through "immense deposits of quartz schist (?) and hornblende schist that carry $34 to $43 values in flour gold," and that a shaft has been sunk 250 ft., "every foot of which was in ore that ran $34 or better." The company has been looking for copper for months, but all at once by "careful assays by a new process consisting of a combination of fluxes and fire," the presence of gold was discovered; and the reason that the gold was not discovered in these Lake George ores years ago is, it is further stated, due to the fact that "the values were in flour gold, and were driven off in the fumes and gases by the old fire assay methods," and further, that these values are to be saved now by a "special form of concentration." What a pity that the "old fire assay" should be so unreliable, and that no remedy has been found for it, as for thirty years we have been hearing stories about ore carrying high gold values that were not revealed by the "fire assay!" Also, what a pity if the story of the discovery of this great goldfield is true, that its announcement in a daily paper should be accompanied by such piffle.

Exceptional interest now attaches to the advance of the Cripple Creek deep drainage tunnel, as it is now believed to be entering the mineral-bearing area, and this idea is strengthened by the fact that the heading is in fluorine-stained rock, a characteristic of many of the veins of the district. The district, which contains 6500 acres, has been heretofore successively drained or partially so by four tunnels, the Blue Bell, Ophelia, Standard and El Paso; the recession of water in the mines on the completion of each showed that it had a general level. The present tunnel will be over 700 ft. below the El Paso, the next one above it, and it is estimated by the engineers of the district that its completion will effect a reclamation of ore of a gross value of $130,000,000; and this is based on the hitherto average production of $250,000 per vertical foot over the whole camp. The permanence of ore down to the lowest workings of many of the big mines strengthens the above belief.

The Iron Silver Mining Company, Leadville, has resumed the sinking of the Tucson shaft, which work terminated about a year ago in the middle of the lower quartzite. The next lift will probably put the shaft well into the granite. The principal object in this work is to get below the orebodies, which have gone down below the present bottom level of the mine. It will also develop the fissure system in the quartzite, from which considerable high-grade ore was obtained during the last six months. Three separate contact deposits have been profitably worked through the shaft: first, the porphyry and blue limestone contact; second, the contact between the blue limestone and intrusive gray porphyry; third, a shoot over 900 ft. long near the bottom of the white limestone, and underlying another sheet of intrusive porphyry.

Indianapolis

Jan. 24—Mayor Shank, Governor Marshall and Aquilla Jones, president of the Board of Trade, welcomed the 1600 delegates to the convention of the United Mine Workers of America, Jan. 18. Governor Marshall said he hoped to see an employers' liability act passed in the mining States that will provide for adequate payment for injuries to employees under whatever condition of contributory negligence on the part of corporations. President Lewis, in responding to the welcome said: "I believe it better that the application of common sense should be the basis of the new method of promoting industrial peace in the mining regions. The strike as a method of organizing has not proven a success. The enormous expenditure of funds and the tremendous waste of energy incident to industrial strife, should be avoided. Our right to strike can never be surrendered, but it should be the last resource and every other means exhausted before a suspension of work is ordered or takes place."

Edwin Perry, secretary-treasurer, in his annual report deplored the unprecedented loss of life in the mines of America during the last year and declared that, "not until the function of protecting life is placed where it rightfully belongs, namely, on the operator or mine-owner, can we reasonably expect any material change." The report showed that the income of the association for the year was $831,730, making a total of $1,427,470 in the treasury. The expenditures were $956,639, leaving a balance of $470,602, a sum less by $125,119 than a year ago.

The mine workers in convention are emphasizing their position of former years in demanding the enactment of a law creating a national bureau of mines and mining. They also insist that the testing stations and other agencies now established should become part of the bureau.

The real interest of the convention centers in the conference to be held with the operators in Toledo to consult upon the making of a new wage contract. It may be that an attempt will be made to agree upon a sliding wage scale, to be based on selling prices.

Scranton, Penn.

Jan. 24—The first step of a practical kind taken since the passage of the act authorizing county judges to purify the mine-examination boards of the anthracite regions was effected last week by the judges of the Luzerne county court. Some time ago the officials of the first district of the miners' union petitioned the judges of Luzerne county court to oust the existing members of the examination boards, on the ground that the members were corrupt, inefficient and partial. The indictment was perfectly true. Fradulent miners' certificates during the past 20 years have been issued wholesale throughout the anthracite regions, but nowhere with such systematic audacity as in Luzerne county. It was stated by counsel for the petitioners that 90 per cent. of the certificates held by foreign miners were fraudulent. In all probability he could have placed the percentage higher without exaggeration. Practically every saloon in Luzerne county, owned by a foreigner, retailed miners' certificates. Mine inspectors have frequently stated that nearly every disaster in that county—and they have been frequent—was due to the possession of certificates by incompetent persons.

In appointing the new boards the judges took into consideration the representations that were made to them, dismissed all the members of the old boards and filled their places by practical miners whom they believe to be men of integrity and experience. Instead of appointing three men to each district of the county as an examining board, the judges have appointed 10 men for the entire county with a chairman at their head. These examiners will be permitted to organize as seems best to them, set the dates of the examinations and follow out the intention of the act as well as they can. The judges will not interfere with them in the execution of these duties as long as they perform them properly.

Cobalt

Jan. 22—The first shipment to be made from Gowganda this year was recently sent out from the Blackburn mine. The shipment consists of 20 tons of high-grade ore that will assay about 2800 oz. and 10 tons of medium-grade ore that will run approximately 500 oz. of silver per ton. The ore was teamed out from the mine to Charlton. There are now a large number of teams on the road hauling supplies, and it is estimated that there will be about 10 carloads of ore to be brought out of the Gowganda camp.

The Bartlett mine, which was last year responsible for a great part of the publicity given to this section, has reverted back to the original owners, McLaughlin & McIntosh, as the Bartlett company failed to make the last payment. It is a peculiar thing that although this company spent thousands of dollars, and a great deal of it wastefully, absolutely no money was spent in surface prospecting and this is particularly noticeable in a country where this form of prospecting is practically the only means of picking up the numerous small veins which constitute the silver-bearing ores of this district.

Another big discovery of free gold in the Porcupine district was made recently on two lots in the southeastern part of Tisdale township. The samples brought in showed an abundance of nuggets. A party of Cobalt men recently sold five claims, some of which showed free gold, for $20,000. A great deal of interest is centered in the diamond-drilling operations on the O'Brien claim, which are to test the vein at a depth of about 100 feet. As the option on the claims will soon expire the results are looked forward to with considerable anxiety, not only by those holding the option, but also by all who are interested in the country. Several stages are now running regularly and about 50 teams are hauling supplies into the camp. The trail from the railroad to Porcupine lake is 33 miles in length, and the stages can make the trip in a day.

Toronto

Jan. 22—A. A. Coles has made a report to the Ontario government of his inspection made last month of several of the best-known properties of the Porcupine Lake gold district. He states that as there was at least one foot of snow on the ground his inspection was confined to the Dilson, Miller, Gillies, Hollinger, Davidson and Bannerman claims, on all of which he saw free gold in place. The veins are composed for the most part of rusty quartz with a wallrock of schist. In southern Tisdale on the Wilson, Miller, Gillies and Hollinger the veins run northeast and southwest and stand up in ridges above the adjacent schist. To the north of the Bannerman and Davidson the veins are not so prominent. Mr. Coles was informed that some of the schist adjoining the veins also carries gold. Several veins will average 25 ft. in width, and the large vein on the Wilson was stated to average 75 ft. in width for at least 500 ft. Very little work had then been done on them but all the signs were favorable for a good gold camp.

On Jan. 19 the Mines and Minerals committee of the Canadian House of Commons at Ottawa entered upon an important investigation as to the nickel resources of Canada. Arthur Wilson, an expert who has been for some time investigating the situation, gave important evidence as to existing conditions. He urged that development had been retarded by the fact that the mines were largely controlled by the International Nickel Company, of New York, who by keeping down production maintained the price so high that only governments were able to purchase in large quantities. Tens of millions of tons of the deposits were lying idle because it did not suit the purposes of the trust to hasten production. There was being exported from Canada annually to the New Jersey smelters 38,000,000 lb. of nickel matte, the loss in wages to Canadian artisans owing to its not being manufactured as a finished product before export, being over a million dollars annually. He suggested that an export duty should be placed on nickel matte and that the government be recommended to foster in every way the manufacture of nickel steel in Canada. The committee decided to institute an investigation into the operations of the trust and to summon officials of the Canadian Copper Company, representing the Canadian branch of the international organization to give data as to the industry.

A bill introduced in the House of Commons by George Gordon of Nipissing to strengthen the existing legislation for the punishment of ore stealing, received a third reading on Jan. 19. It makes it a criminal offense for anyone to be found in possession of gold or silver ore for which he cannot account.

Mexico

Jan. 22—The Guatemala government has given assurance that the permit for building the Pan-American railroad's international bridge will be granted at once. This means that construction will be begun upon the bridge and that the connecting link between the Mexican railroad systems and the railroad lines of Guatemala will be soon constructed, affording the promised south extension of the Pan-American railroad. The Pan-American road recently passed into the control of the former American Ambassador Thompson, and is said to be well backed financially, to carry on the plan of extending the line through the Central American countries to ultimately connect with the Panama canal. The Pan-American railroad now runs from the station of Geronimo, on the Tehuantepec road along the Pacific coast to the boundary of Guatemala. It has been built for several years and is said to be a profitable road, but with the extension will become important as opening up an outlet by rail for the mineral and agricultural resources of the Central American countries. The mineral development along the Pan-American road in Mexico has not been important so far, although those who have investigated say that the possibilities are large. Some interest was developed in a silver property in this territory some years ago, but on investigation it was proved that the deposit was not extensive. Operations are being carried on at several copper properties in Chiapas, which are tributary to the road, although not directly on the line, and investigations of a copper deposit at Tonala have been made recently. The whole country, south of the Tehuantepec line, and extending into Guatemala, is very inadequately explored as to its mineral resources, and there are reasons to expect that important deposits will be developed there with the extension of the railroad and the assurance of better transportation facilities.

The island of Tiburon, in the Gulf of California, has at last yielded up its mystery. An expedition of American explorers has returned from the island and Fayette A. Jones, of Albuquerque, N. Mex., a mining geologist, who accompanied the expedition, writes specifically concerning the mineral possibilities of the island. He says:

"The recent expedition penetrated the interior of the island and practically covered every portion of the same, where any mineral would seem most likely to exist. Nothing of value in minerals was found and the unanimous verdict of the party pronounced the island practically destitute of mineral wealth. Thus, the supposed golden treasure of the island is now a shattered dream, and the spell of enchantment that once surrounded it has been forever broken by the Jones' expedition. The purported find of pitchblende by the Meadow's party is not credited, and what that party doubtless mistook for pitchblende was evidently obsidian, since abundance of that rock abounds.

"Geologically, the island is volcanic, and was doubtless elevated at or near the close of the Tertiary. The types of lava are profuse and belong to the effusive class. The nearest approach to a true granite is in the northeast part of the island and would, perhaps, be more properly classed as granite porphyry, rather than a true granite. No limestone or sedimentaries were observed, although a small fragment or two of limestone were found, seeming to be an occluded fragment from one of the lavas. The principal eruptive types of rock are species of andesite and rhyolite, the latter passing into the extreme phases of obsidian and pumice stone."

For many years it has been heralded that there were fabulous riches on this inaccessible island which were rendered unavailable by the terrible cannibals of the island, according to the lurid stories of the frontier journalists. Tiburon island apparently is no longer of interest to the prospector or the explorer for mines and minerals.

THE MINING NEWS

REPORTS OF NEW ENTERPRISES NEW MACHINERY· INSTALLATIONS· DEVELOPMENT WORK AND PROPERTY TRANSFERS THE CURRENT HISTORY OF MINING

Alabama

BIBB COUNTY

The Woodstock Iron Company has blown out its furnace at Woodstock after a short run. It is said that a thorough reconstruction of the plant is needed.

JEFFERSON COUNTY

Birmingham Horseshoe and Rolling Mill Company—This company has let the first contracts for the construction of steel works, a rolling mill and forge at Gordon Heights, between Birmingham and Bessemer. The plant will cost over $150,000. Officers of the company are N. K. Reid, of Middleton, O., president; W. T. Shipe, vice-president; T. R. McCarty, secretary and W. A. Porter, Birmingham, treasurer.

Alaska

Kupreanof—This copper mine is making preparations to ship about 500 tons of ore March 1. John T. Towers, Sitka, is manager.

Arizona

COCHISE COUNTY

The December production of blister copper from the Calumet & Arizona smeltery was as follows: Calumet & Arizona, 2,275,000; Superior & Pittsburg, 2,030,000 pounds.

GILA COUNTY

Miami—The first churn drill has struck ore assaying a little better than 2 per cent. copper about 500 ft. in advance of the mine workings in the direction of the Inspiration.

Warrior—The company has been shipping 85 tons daily to El Paso from the 200- and 300-ft. levels, where the ore is being stoped from a 60-ft. vein.

Arizona Commercial—The two winzes being put down from the sixth level between the Eureka and Black Hawk shafts have attained an inclined depth of 75 ft. The connections of the 1000-gal. Prescott pump recently installed on the 700-ft. level of the Eureka shaft have been made and if this pump proves equal to handling the water, crosscutting northeast and southwest will be commenced to open the Black Hawk vein at that depth. Most of the ore is being taken from the sixth level, but the fifth level is also yielding well.

Superior & Globe—A station, 30x9x 10-ft., has been cut at the 650-ft. level, and a 30-ft. sump is ready for the final timbering. The crosscuts north and south from this station have been driven 30 and 18 ft. respectively. The south crosscut is being driven to open the Yuma vein, and the north crosscut will cut two veins that outcrop north of the shaft. The foundation for the new 60-h.p. hoisting engine is nearly completed. H. V. Snell is superintendent.

MOHAVE COUNTY

The Idaho and Broken Hill mines, owned by E. F. Thompson, have been bought by E. A. Clanton, Jr., of Philadelphia, and A. M. Masters, of Jacksonville, Ill., who bonded the Golden Star mine at Cerbat recently.

In the San Francisco district the Carter shaft is being put down rapidly. In the same district C. F. Kuencor, of Pasadena, Cal., has sold the Golden Star, Esperanza, American Boy, West Point,, Red Bluff and Felix prospects to H. H. Simpson, of Los Angeles, for $27,500.

L. D. Godshall, local manager for the U. S. Smelting, Refining and Mining Company, continues to buy mining property in the Cerbat range. The latest purchase is the Summit mine on Stockton hill, owned by James Bone. Doctor Godshall proposes extending the present crosscut tunnel on the Summit about 600 ft., and will begin work at once. As soon as hoists arrive, he will also start active development on other prospects recently acquired.

Goldconda—A new zinc orebody has been discovered on the 300-ft. level at the junction of the drifts connecting the two shafts. This is probably the middle vein of a parallel system of three traversing the mine and of which one alone has furnished all the ore shipped to the present time. More ore wagons have been added, but the ultimate solution of the transportation problem lies in the building of a spur, a survey for which has already been made, and which is now being considered by Santa Fé officials.

Dixie Queen—This mine in the Virginia district is to be equipped with four Nissen stamps.

YUMA COUNTY

Tank Pass Consolidated—The company owns claims in the Harcuvar mountain, nine miles north of Salome. One property, the Ultimatum, has been under development by a Houghton (Mich.) company for some time. The ore is copper, carrying gold and silver. An inclined shaft is being sunk on the Carbonate Hill group, and on the Ultimatum drifting is being done at the 100-ft. level. A new vertical shaft will be sunk to 500 ft. on the Carbonate Hill. D. W. Hall is superintendent.

California

AMADOR COUNTY

Ginnochio—A shaft will be sunk at this mine in Murphy's gulch. George Hambric is interested.

Kennedy—The old officers of this company have been reëlected. At the 3300 level the hanging-wall vein has been cut and shows 5 to 6 ft. of good ore.

Bunker Hill—The cleanup for December was at the rate of $1100 per stamp, though a large quantity of low-grade rock was crushed to save ore handling.

CALAVERAS COUNTY

Cuneo—This mine at Esmeralda is running a tunnel with machine drills under superintendence of Edward Steinberg, of Sheepranch.

KERN COUNTY

Yellow Aster—It is reported that the property has been sold. Extensive developments have been undertaken recently and the results are said to have been favorable.

NEVADA COUNTY

Constitution—John Drabb is running two drifts at this property, one on the Constitution and the other on the Great Western vein.

Last Chance—Lucian Kahn has begun work on reopening this mine in Washington district. There are three veins.

PLACER COUNTY

Neilsen & Harrie—This company in Canada Hill district, above Westville, is opening up a tunnel to reach the gravel.

La Trinidad—At this mine, Westville, J. L. Robinson, superintendent, work has begun on the new tunnel.

SAN BERNARDINO COUNTY

Bagdad Mining and Milling Company—The Orange Blossom Mining Company property, nine miles from Bagdad, recently sold under bankruptcy proceedings, has been given this name and new stock will be issued to holders in the old company. The main shaft will be sunk to 600 feet.

Needles Mining and Smelting Company—This company has been organized

as a subsidiary of the United States Smelting, Refining and Mining Company to operate the recently purchased Needles smeltery and the numerous Arizona and California properties also recently acquired. The smeltery will be enlarged. L. D. Godshall is general manager.

SAN LUIS OBISPO COUNTY

At Chorro, Easton and Albert Mills have agreed to put up a five-stamp mill on a mining property owned by Lewis Silva, and others.

Young America—This drift mine at Forest, closed for a year through litigation, is being reopened under direction of W. M. Beggs.

Mott—At this mine near Forest, Manager O. A. Harlan has started the work of reopening by drifts and inclines.

SHASTA COUNTY

Uncle Sam—This mine at Kennett is being reopened with Louis Monahan as superintendent.

Milkmaid—The company operating this old mine at French Gulch is called the French Gulch Mining Company; J. J. Sheeby is superintendent.

SIERRA COUNTY

White Bear—Gravel has been struck in this property at Monte Cristo.

Sixteen-to-one—This mine at Alleghany which has been idle on account of litigation will be reopened with E. H. Wilson as manager.

SISKIYOU COUNTY

Elk Creek—This mine at Hawkinsville, north of Yreka, is milling ore worth $50 per ton.

Colorado

LAKE COUNTY—LEADVILLE

Spring Steel Tunnel—In order to develop claims on the north side of the Lillian property, this tunnel has been driven 500 ft. and is being pushed ahead, and has about 400 ft. more to go. Another tunnel has been driven on the Lovejoy claim, Printer Boy hill, both under the superintendence of J. C. Hersey.

Breece Hill Mining and Development Company—The company, operating in Adelaide park, has under lease the Dolomite, Laurel, Echo, Cora Bell and Nezahakoa claims. A new shaft on the Dolomite has been completed, and shipments are going forward, under the management of S. P. Fremont.

Ollie Reed—The property, in South Evans gulch, is being prospected with two shafts.

Cleveland—The 1200-h.p. electric hoist is now installed and running.

Adelaide—The mine, being worked through the Yak tunnel, is shipping about 400 tons of sulphide ore monthly.

Mikado—Leasers on this old-time banner producer have caught a streak of ore 6 in. wide that runs high in silver and copper.

Ibex—Leasers on the Little Jonny, seventh level, ran into a small streak of ore that gave unusually high returns in gold and silver.

Colonel Sellers—The shaft has been unwatered, and the first carload of zinc ore shipped. It is expected to hoist 100 tons daily.

TELLER COUNTY—CRIPPLE CREEK

Abe Lincoln—This mine, which belongs to the Stratton estate, in Poverty gulch, is shipping from a 3-ft. vein on the 300 and 400 levels.

Portland—This company paid its first quarterly dividend for 1910, Jan. 16, at the rate of 2c. per share, amounting to $60,000, making the total amount of dividends paid $8,497,080.

W. P. H.—This mine is sinking its shaft to 600 ft. with the object of catching on its dip the flat vein from which the Jerry Johnson adjoining is producing so heavily.

Findley—President Carlton's report gives the production for 1909 at 6820 tons, of a value of $155,663. The company has $16,000 in the treasury, and no debts. Lessee Frank Clay has entered a rich oreshoot between the 10th and 11th levels.

Jennie Sample—It is now announced that James F. Burns, formerly president of the Portland company, has purchased a controlling block of stock in the Jennie Sample company.

Vindicator—This company will pay its first quarterly dividend for this year, amounting to $25,000, on Jan. 25. Its production from Bull hill during December was about 3000 tons of gold ore, with an estimated value of $75,000.

Joe Dandy—The lessee on this property, W. L. Shocky, is said to have opened a new vein 3 ft. wide. In addition to this is a narrow seam of sylvanite and free gold returning $3 per pound of ore.

Stratton Estate—The American Eagle, under lease to the Colorado Mines Investment Company, of Denver, is shipping good ore.

Idaho

The mineral production of Idaho for 1909 is officially given at $15,000,000, an increase of a million and a quarter over 1908.

CŒUR D'ALENE DISTRICT

Bunker Hill & Sullivan—Fine bodies of ore have been opened 600 ft. below the Kellogg tunnel, giving a depth of 3000 ft. on the dip of the vein. The ore surpasses in quality that on the Kellogg level. The two mills are treating 1500 tons daily.

Government Gulch—This property has been optioned to the Federal company for six months. Option price is 3c. per share. The Federal tunnel disclosed a vein of high-grade galena in Government Gulch ground.

Hercules—This company is treating 350 tons of lead ore daily in the Tiger mill.

Blaine & Emmet—Development has been begun by a new company.

Morning—One of the largest stations in the world has been completed at the end of the two-mile tunnel. From the station a four-compartment shaft will be sunk.

Monarch—The output will be increased when a raise 864 ft. long is finished Feb. 1. The mine is shipping eight carloads per month.

Indiana

CLAY COUNTY

The drawing of the pillars of the Bogle mine near Brazil, caused the surface to sink for 6 to 8 ft. A number of houses, occupied by miners, were toppled from their foundation, and a large brick school house, recently completed, was ruined. The township trustees will bring suit against the company for damages to the school house.

GREENE COUNTY

The Glenburn mine, owned by the United Fourth Vein Coal Company, is hoisting coal for the first time in two years. This mine was closed two years ago for repairs. Since then it has been carefully overhauled and is now in first-class condition.

SULLIVAN COUNTY

The Union mine north of Sullivan has broken its record by hoisting an average of 901 tons a day for the last week.

A fire occurred in Hymera No. 33, Jan. 19. The superintendent and miners were hoisted just in time to save them from suffocation. The fire is believed to have been of incendiary origin, as it was started in an entry. The mine inspector is making an investigation.

VERMILION COUNTY

Charles Walter, who recently completed sinking mine No. 4 for the Clinton Coal Company, has begun work sinking a mine for the Jackson Hill Coal Company east of Clinton, and at a point between Deering mines Nos. 6 and 8.

The Miami Coal Company, which has just commenced to hoist coal from a new mine sunk south of Clinton, has begun to sink another shaft.

VIGO COUNTY

Augustus Bayne & Son, of Coalmount, are incorporating a company to sink a shaft on the Bayne farm, near Coalmount.

The Retlaw Mining Company has been organized for the purpose of shipping coal and other minerals. Amount of stock, $100,000. Waller S. Bogle,

Charles W. Gilmore, James K. Wallace, Walter V. Adams and John Shirkie, directors.

Michigan

COPPER

Mohawk—The company has encountered the Kearsarge lode in the crosscut driven from the first level, 210 ft. from the surface of its No. 6 shaft. The lode is well charged with copper and gives promise of yielding much better mineral returns than at other portions of the mine. The crosscut will be extended to the hanging-wall side and then drifting north and south will be started. Sinking is to be resumed in the shaft, which is going down in the footwall 60 ft. behind the lode.

Hancock—No. 2 shaft is nearing the point where it is calculated that No. 2 lode will be cut. This lode has been opened by No. 1 shaft near the surface, and while it is not as well mineralized as No. 1 or No. 3 lodes, its opening at depth will be awaited with interest. The openings on No. 3 lode are continuing in well mineralized ground.

Lake—The rock crusher has been installed and everything is in readiness to begin shipments to the Franklin mill. It is planned to ship about 1000 tons per week. The crosscut from the sixth level is going forward and will soon reach the lode, its existence having been proved by a drill; the core taken shows the same high-grade mineralization as opened in the upper levels. A contract has been let for a high-duty hoisting equipment for summer delivery.

Superior—At No. 1 shaft a crosscut is being extended to cut the lode at the 13th level, and the extension of drifts from the levels above are maintaining the same mineral contents. A much better recovery of copper is being noted at the Atlantic mill, owing to the changes put into effect, which include the pulverizing of the sands.

Franklin—This mine has started exploratory work to ascertain conditions of the No. 3 Hancock lode on its lands.

Oneco—The company has made arrangements for a second drilling outfit, and as soon as it is delivered will go into commission in proximity to the recent strike. No. 5 hole is down about 750 ft. on its way to cut the Oneco lode, which it is calculated will be reached at a depth of about 1000 ft. When this has been finished the drill will be moved to the eastern portion of the tract and a hole put down vertically to cut the New Baltic formation.

Atlantic—Operations are centered in underground exploratory work at the section 16 tract to open up the Baltic lode. The shaft is down to the 25th level, and from that point drifts are being extended in both directions with very encouraging ground being exposed. At the 16th level a crosscut is being driven eastward across the tract; it is now 800 ft. from the shaft and has cut several copper-bearing formations, but no lateral work has been started on any of these. At the 13th level a limited amount of stoping is being done.

South Lake—The company has encountered three copper-bearing lodes with its No. 1 drill. These lodes will be further opened by drill work. No. 2 drill is operating vertically to penetrate the Lake lode.

Adventure—This company has called an assessment of $1 per share payable Feb. 1, to provide for exploratory work. The only work being done on the property is the sinking of a vertical shaft to expose the three copper-bearing lodes revealed by the drill.

Elm River—The company will be reorganized under the laws of Michigan with a capital of 100,000 shares at $25 par value. This reorganization will provide for further explorations. Crosscutting is being done from the bottom of its exploratory shaft.

Missouri

The Puxico Iron Company has been organized as successor of the Puxico Mining Company to work a deposit of brown iron ore in the Ozark region. The offices are at Cape Girardeau, Mo. C. J. Crawford is president and A. J. Meyer, treasurer.

JOPLIN ZINC-LEAD DISTRICT

United Zinc—This company has taken a lease on 97 acres of the Riseling land west of Joplin, near the Mikado and Live Oak mines, and will work the sheet ground as well as the upper ground.

Granby—The company is drilling the Lone Elm land at Joplin where shallow lead and zinc deposits were worked many years ago. The land has never been worked to a deep level on account of the strong flow of water. The Granby company is reported to be developing this land with the idea of mining the tract instead of leasing it as has been the custom.

Montana

BUTTE DISTRICT

Amalgamated—The Leonard and East Colusa mines and the Silver Bow, Berkeley and Gray Rock mines are again working. The mine-coal supply is coming into Butte regularly so there is no immediate apprehension of a fuel shortage.

Butte & Superior—A seven-drill compressor has been installed and another 20-drill compressor ordered. Shipments of zinc ore are being made to the Basin concentrator at the rate of 200 tons daily. The crosscut from the Black Rock shaft to the recently acquired Colonel Sellers shaft is now in about 75 feet.

British-Butte—The annual meeting of stockholders has been held in Butte. Norman W. Jenks, son of one of the heaviest British stockholders, was appointed general manager to succeed Colonel De Hora. During the meeting a telegram was received from the company's attorney at Washington to the effect that the hearing on the contested patents for the company's placer ground had been completed but no decision reached. In the hearing at Butte the company won, but the Government appealed the case to the Department at Washington. The diamond drilling on the placer ground is going on with one shift but three shifts will soon be put on. No definite date for the resumption of dredging operations was decided upon but the decision of the contested applications for patents will probably be the determining factor in the matter.

Butte-Ballaklava—Foundations are being built for the electric hoist. The hoist has double drum and is capable of sinking 2000 ft. The old steam hoist will remain in position for emergency.

JEFFERSON COUNTY

Corbin-Montana—At a recent meeting of directors the name of the company was changed to Corbin Metal Mining Company to avoid the similarity of the former name with that of the Montana-Corbin company operating in the same district. The shaft is now down 290 ft. and will be sunk 700 ft. before drifting is done.

Boston & Corbin—The new electric hoist, good for 2000 ft., is being installed and the motors and new compressor are being placed in position. The pole line is completed. A 200-ton concentrator will be erected in the spring.

Amazon-Montana—A gallows frame and an electric hoist good for 500 ft. are being installed, and a compressor has been ordered. A power line is being constructed from the main line of the Missouri River company to the mine, 1⅔ miles. The shaft is down 100 ft. and will be sunk 250 ft. before other development is done. Crosscuts will then be run north.

Montana-Corbin—The shaft is down 400 ft. and sinking is being pushed.

GRANITE COUNTY

Shakespeare—The management states that a 30-in. vein of high-grade ore has recently been encountered. The mine has not produced in ten years but about a year ago was purchased by L. U. Loomis and others who have been steadily engaged in exploration.

MADISON COUNTY

Conrey—Plans for a new gold dredge will be submitted to the directors shortly.

Elfrieda—Duncan Brothers are mak-

ing regular shipments from the mine near Virginia City.

Nevada

Lander County

Western Milling and Reduction Company—The company, M. C. Scully, manager, will erect a 20-stamp mill at the new gold district of Kimberly, 18 miles from Battle Mountain.

Lincoln County

The disastrous flood of New Years' day on the Salt Lake route which destroyed nearly 100 miles of roadbed was also a great calamity to the mining interests in the Pioche district. Most of the branch line from Caliente to Pioche was destroyed and Modena, Utah, is now the nearest railroad point, both for mail and supplies, a 40-mile haul over rough wagon road. This means that a great many mines about Pioche will have to close down for some time, until the railroad can be rebuilt which probably will be over a new route nearer Pioche to avoid similar washouts in future.

Alunite—This property, in charge of Robert T. Hill, of New York, will resume development.

Lenape—This company has been organized to operate claims in the Searchlight district. A. M. Jennings is manager. The property yields copper and free milling gold ore.

Lyon County

Rock Point Mill—The plant at Dayton, destroyed by fire, has been rebuilt. It has 40 stamps.

Storey County

Union Consolidated—A new north drift was started from a point in the east crosscut, 930 ft. from the shaft, on the 2000-ft. level. Development here will be watched with interest.

White Pine County—Ely

Giroux—The annual meeting of the company will be held at Duluth, Feb. 1.

New York

United Mining Company—Frank C. Baker has been appointed receiver on the application of Francis C. Nicholas, a bondholder, who obtained a judgment against the company for $70,017. The company is a Maine corporation incorporated five years ago and capitalized at $8,000,000. The company holds a controlling interest in the United Mining and Development Company of America, and had options on numerous mining properties in the United States, Mexico and Canada.

North Carolina

Brewer—W. U. Clyburn, Lancaster, has purchased the mine tract with machinery and property, paying $20,000. The DeSoto Mining Company operated this mine in the northern part of Chesterfield county.

Consolidated Nickel—Three mines at Webster are installing machinery.

Oklahoma

Omaha-Petersburg—This company is planning the erection of a 500-ton mill at Quapaw and has asked for bids.

Oregon

Eastern Oregon

Many mines in this district have recently reopened, after having been closed down for many months, the principal cause being due to the extension of the Sumpter Valley railroad from Austin to Dixie, the crest of the mountains.

White Swan—The mine was purchased, Dec. 13, by D. W. French, of Baker City. The future operation of the mine has not yet been decided.

Red Boy—The mine, in the Granite district, 40 miles west of Baker City, under management of D. W. Chapman, is running two shifts and shipping rich ore.

Pennsylvania

Anthracite Coal

Lehigh Valley Coal Company—This company has let a contract to the Jenkins Contracting Company to do a large amount of stripping on the Mammoth vein at the Continental colliery, 1½ miles east of Centralia. The vein is to be uncovered for about a quarter of a mile, and will be mined on the open-pit plan; but the coal will be handled underground to the Centralia breaker.

Bituminous Coal

Hicks Coal Company—This company at Leechburg, is arranging to put in 15 new coal-cutting machines, with the necessary electrical equipment.

Utah

Beaver County

Cupric—This property near the Horn Silver mine is planning to ship. A railroad spur will be built.

Horn Silver—The company has entered into a contract with the American Smelting and Refining Company for the treatment of 2500 tons monthly.

Moscow—A body of lead-carbonate ore, carrying silver, has been opened on the 400-ft. level. Angus Buchanan is manager.

Orphan Boy—A strong vein has been encountered in the tunnel on this property.

Juab County

American Star—The company has made final payment on the Town View properties, Tintic and will sink to 1100 ft. to develop ore proven from the 900-ft. level of the Eagle & Blue Bell mine.

Salt Lake County

Bingham Mines Company—This reorganized company has cleared all litigation and effected the consolidation of the Yosemite, Cluster and Mississippi properties and will resume operations. The company is the legal successor to the Bingham Consolidated Mining and Smelting Company.

Tennessee

The Maxwell Knight Iron Company has been incorporated to work the Maxwell iron-ore land on the Virginia & Southwestern road, three miles from Butler, Tenn. The tract includes 600 acres, with a large deposit of brown iron ore. H. V. Maxwell, of Butler and H. J. Knight, of Boston, are the incorporators.

South Dakota

Homestake—The property has resumed operations and it is expected will be running as usual in a few weeks with nonunion labor.

Columbus and Hidden Fortune—Negotiations are under way to consolidate and reorganize these properties near the Homestake.

Gold Dollar—The property will be operated soon. The Eleventh Hour mill is erected on the Crown Hill claims. Stamps will be substituted for rolls.

Virginia

It is reported that the mine of arsenical pyrites of Brinton, Floyd county, is to be reopened soon by C. R. Brinton, of Floyd, who is also arranging to establish works for the manufacture of paris green at Norfolk. The Brinton mine has been closed for over two years; it was last worked by a Pittsburg company.

Wyoming

In the Sunlight Basin mining district east of the Yellowstone Park and 35 miles north of Cody, the Winons Mining Company of Denver is driving a tunnel now in 800 ft., and the Gold Dollar company is planning to begin operations in the spring on a placer deposit.

Canada

British Columbia

Consolidated—The company will build a two-mile tramway from mine No. 7 to Boundary falls, where a mill will be erected.

Tyee—The December report is as follows: One furnace in blast 26⅓ days; smelted 7400 tons, producing 625 tons of matte, valued at $92,000.

Ontario

Shipments of ore from Cobalt for the week ended Jan. 15 were as follows: Buffalo, 64,500; City of Cobalt, 54,000;

Coniagas, 59,945; Crown Reserve, 122,-432; Drummond, 230,000; La Rose, 255,-972; Right of Way, 63,061; total, 859,-910 pounds.

À 99—On this property in the Gillies Limit, owned by J. H. Waldman, a smaltite vein 1½ in. wide carrying silver has been traced for 60 ft. on the surface. A shaft will be put down.

Waldman—The shaft is down 75 ft. and preparations are being made to stope east and west. The vein dipped out of the shaft at 70 ft. and had to be reached by a crosscut. From this a raise was started, the vein showing at the head of the raise with about 8 in. of good smaltite ore carrying native silver. Drifting has been done for about 70 ft. to the west at which point a raise will be started. Diamond drilling will be done from the bottom of the shaft to discover the dip of the vein at 150 ft., further sinking of the shaft being delayed until cheap power is available. Several tons of high-grade ore have been sacked. The property is in the Gillies Limit near Cobalt.

Mikado—This mine, Lake of the Woods district, has been closed for the last seven years but an option has been taken by Capt. H. A. C. Machin who will shortly begin active operations.

Northern Pyrites—The company intends to electrify the mine equipment and to install a crusher plant at Fort William where cheap power can be obtained. The property is at Lake Superior junction, F. C. Becker, manager.

Atikokan Iron Company—On the application of Mackenzie & Mann, who are extensive shareholders in the company, Judge Clute made an order Jan. 19 staying proceedings against the company on Sept. 8 and discharging Joseph D. Fraser, provisional liquidator. The shareholders have procured the necessary funds to satisfy all debts and continue the business. The property is near Port Arthur.

Reeve-Dobie—A shipment of about 30 tons of high-grade ore has been made to the Coniagas smeltery at Thorold, Ont. This is the second shipment from the Gowganda district.

McArthur Gold Mining Company—Peter McLaren, representative of this company, Porcupine lake, the headquarters of which are in Glasgow, Scotland, has gone to Porcupine to push development work on the Bannaman, Way and Griffith claims at the northwest end of Porcupine lake. Two test pits are down on a quartz vein varying from 4 to 8 ft. in width, a short distance apart with good gold showings in both. Shafts will be at once put down.

YUKON

Extensive preparations are being made for the building of a power ditch near the mouth of the North fork next spring. A. N. C. Treadgold is interested in the project, and will use the power to be developed on several creeks of the camp.

Lone Star—One of the most encouraging results of quartz work in the Klondike has been obtained on this property in Victoria gulch. The tunnel tapped the vein at the 90-ft. level.

Mexico

CHIHUAHUA

The New York officers of the Chihuahua Mining Company and of the Potosi deny that there are any pending negotiations for the rate of the properties.

The monthly zinc shipments from Chihuahua are 3000 tons as compared with nearly twice the figure before the United States tariff changed. Foreign agents are negotiating with several of the largest shippers of high-grade ore in the eastern part of the state.

San Gregoria and Esmeralda—These properties, near the Mina Vieja, Santa Eulalia, have been purchased for $150,-000 by the Exploration Company, of London.

Los Sauces—This company, of which Frank Hine is manager, has completed its matting plant which will be started up shortly. The plant is reached from Santa Maria del Oro in the Parral & Durango railway, and is near the Durango state line.

San Jose del Sitio—The surface improvements, including a 40-stamp mill and 22-km. railroad of the Pittsburg company formerly operating at this place in western Chihuahua, have been levied on for wages and supply accounts. The property has been idle for several years.

El Rayo—The results for December were: Mill ran 29 days; ore crushed, 4300 tons; value of ore per ton, $14.33; extraction, 83 per cent.; value of product shipped, $46,326; operating expenses, $27,465; operating profit, $18,860.

GUANAJUATO

Guanajuato Consolidated—The report by telegram for December was: Mill ran 30 days and crushed 7784 tons of dry ore; concentrates shipped to smeltery, 183 tons; estimated realizable value of bullion, 59,400 pesos; of concentrates, 52,200 pesos; total gross value, 111,600 pesos; expenses, 72,800 pesos; estimated profit, 38,800 pesos. of this 9200 pesos was expended on 354 ft. of development.

HIDALGO

Real del Monte y Pachuca—The company has declared a dividend of 200 pesos per share.

JALISCO

Tecalitlan—A 20-ton Bryan mill and concentrating and amalgamating equipment have reached the properties of A. J. Stewart and G. S. Johnston in the Nogales camp, Tecalitlan district. Three gold and gold-copper mines are being developed. The machinery will be operated by water power.

Amparo—Reports for the last two months show that a production of over 100,000 pesos monthly is being maintained. In November the output was $111,402 pesos, from 5103 dry tons of ore, and in December, 111,449 pesos, from 5440 tons. A body of high-grade ore was recently encountered, and shipments are being made.

MEXICO

Esperanza—The December return was as follows: Mill ran 27 days and crushed 14,450 dry tons of ore; tailings treated, 2962 tons; concentrates shipped to smeltery, 28 dry tons; estimated realizable value of bullion, $220,086; concentrates, 20,937; receipts from other sources, $877; total, $241,900; less mine expenses, $118,329, leaving $123,571; estimated profit, £25,072. Expended on construction account, $13,419; 913 ft. of development were done.

QUERETARO

El Doctor—This mine, owned by the Braniff estate, has completed a tramway 22 km. long from the Santo Entrerro to the smeltery, and is operating under favorable conditions. L. A. H. Stockdale is manager.

TEPIC

Certuchena—A 20-ton Lane mill and concentrating plant have been erected and are in operation. Steam power is used. Later electric power will be secured. A cyanide annex is planned. The owners are A. R. Bird, of San Antonio, Tex., M. P. Wright of Los Angeles, Cal., and Alfred Lonergan and Sydney Kempton, of Tepic.

Tepic Gold Mining Company—This company, organized in Los Angeles, has acquired gold properties near the Certuchena, Ahuacatlan district.

ZACATECAS

San Carlos—As a result of the recent reorganization, the 50-stamp mill and cyaniding plant at the mines in the Mezquital del Oro district will be immediately overhauled, and extensive development will be resumed.

Asia

KOREA

Oriental Consolidated—The mail advices of the results for November are as follows: 220 stamps crushed 26,182 tons; running time, 27½ days; gross receipts, $138,471; operating costs, $65,601; operating profit, $72,869; put into improvement, 2500; net profit, $70,368.

Australia

WESTERN AUSTRALIA

Gold production in December was 134,-153 oz. fine. The total for the year was 1,595,341 oz., or $32,975,698; a decrease of 52,571 oz., or $1,086,643, as compared with the previous year.

$ · THE MARKETS · $

CURRENT PRICES OF METAL · MINERALS · COAL AND STOCKS · CONDITIONS AND COMMERCIAL STATISTICS

Coal Trade Review

New York, Jan. 26—The coal trade in the West is in a little better shape. Demand continues strong and the mines are all busy, while transportation is improving, both in the matter of car supply and the car movement.

In the East poor car supply and stormy weather are making the trade uneven and uncertain. There is, however, some betterment in demand.

The anthracite trade shows no special incident and continues very steady.

The great point of discussion in the western trade is the wage-scale conference which will take place in Toledo next month. The United Mine Workers at Indianapolis have resolved to ask for a pick mining rate of $1 per ton for next year, which will be an advance of 10 to 15 per cent. on present prices. The operators, on the other hand, declare that a reduction is necessary in view of the present condition of the trade. Doubtless there will be a long discussion ending with a compromise at something like the present rates.

The Anthracite Trust Suits—After some two years spent in taking testimony the Government brief against the alleged Anthracite Trust has been filed in the United States Circuit Court at Philadelphia. It alleges various general and specific acts in contravention of the anti-trust law.

Coal Traffic Notes

Bituminous coal and coke tonnage of leading railroads in Pennsylvania and West Virginia, 11 months ended Nov. 30, short tons:

	Coal.	Coke.	Total.
Balt. & Ohio.....	21,156,064	4,206,225	25,362,289
Buff., Roch. & Pitts.	6,111,609	460,364	6,571,973
Buff. & Susquch'na	1,328,344	296,373	1,624,717
Penn. lines, N. Y. C.	6,849,298	86,147	6,935,445
Pitts. & L. Erie.....	8,994,715	5,061,622	14,056,337
Pitts., Shawmut&N.	851,067	16,546	867,613
Norfolk & Western.	12,736,642	2,387,146	15,123,788
Ches. & Ohio.....	12,399,588	420,879	12,820,467
Virginian	206,798	.....	206,798
Total.....	70,634,125	12,935,302	83,569,427
Total, 1908.....	60,781,059	8,036,551	68,817,610

Total increase in 1909 was 14,751,817 tons, or 21.4 per cent. The Virginian railway report is tidewater tonnage only. In addition to the above the Baltimore & Ohio carried 719,681 tons anthracite in 1908, and 783,355 in 1909; increase, 63,674 tons.

Coal tonnage of railroads in Ohio Coal Traffic Association, 11 months ended Nov. 30, short tons:

	1908.	1909.	Changes.
Hocking Valley.....	3,033,023	3,066,137	I. 33,114
Toledo & Ohio Cent.	1,473,228	1,254,843	D. 218,385
Baltimore & Ohio....	1,319,549	1,416,400	I. 96,851
Wheeling & L. Erie..	2,493,773	2,910,375	I. 416,602
Cleve., Lorain & Wh.	2,217,064	2,342,083	I. 125,019
Zanesville & Western	1,180,104	994,929	D. 185,175
Toledo Div., Pen. Co.	1,410,128	1,695,220	I. 285,092
L.Erie,Alliance&Wh.	986,756	1,016,076	I. 29,320
Marietta, Col. & Clev.	50,791	74,284	I. 23,493
Wabash-Pitts. Term.	.....	32,268	I. 32,268
Total.....	14,164,416	14,802,615	I. 638,299

The total increase in tonnage this year was 4.5 per cent. Only the Ohio lines of the Baltimore & Ohio are included above; the main line is given elsewhere.

Coastwise shipments of coal from Atlantic ports, 11 months ended Nov. 30, long tons:

	Anthracite.	Bitum.	Total.	PerCt
New York....	13,087,275	9,652,531	22,739,806	60.7
Philadelphia	1,824,982	4,318,560	6,143,542	16.4
Baltimore....	211,582	3,079,433	3,291,015	8.8
Newp't News	.....	3,216,661	3,216,661	8.6
Norfolk.....	.....	2,078,880	2,078,880	5.5
Total.....	15,123,839	22,346,065	37,469,904	100.0
Total, 1908.	15,877,952	20,789,970	36,667,922	.....

The total increase in 1909 was 801,982 tons, or 2.2 per cent.

New York

Anthracite

Jan. 26—Business continues good although local deliveries have been seriously disturbed by stormy weather. Barges for city and near-by delivery have been held up and delayed on this account.

Schedule prices for large sizes are $4.75 for lump and $5 for egg, stove and chestnut, f.o.b. New York harbor. For steam sizes quotations are, f.o.b. New York harbor points: Pea, $3.10@3.25; buckwheat, $2.35@2.50; No. 2 buckwheat or rice, $1.75@2; barley, $1.35@1.50. Some coal is reported sold higher where quick delivery is wanted.

Bituminous

In some respects the bituminous trade is improving. There is more demand for coal and it is quite generally distributed. The improvement in trade has not been quite so great as expected, but still there is an improvement manifest.

The leading feature in the trade continues to be the scarcity of cars. On the Baltimore & Ohio mines are doing well if they can get 25 per cent. of the cars they need. On the Pennsylvania the proportion may run up to 50 per cent. Transportation is better and coal comes through in fair time if it can once be loaded.

The car shortage has held back shipments and stocks of coal at tidewater are low. In many cases it is hard work for shippers to fill contracts. Prices continue about the same, and fair grades of steam coal can be had at $2.60 f.o.b. New York harbor points. Gas coal is especially scarce, and it is difficult to get consignments through, consumers being dependent on day-to-day receipts.

The coastwise trade is demoralized. The nominal rate for moderate-sized vessels is 85c. from New York to points around Cape Cod; but vessel owners are afraid of the continued stormy weather and in some cases 90c. and even $1 is asked on pressing shipments.

Birmingham

Jan. 24—There is no hesitation in the coal-mining regions in Alabama and labor is being added to the present forces wherever it can be secured. There is need for all the coal that can be mined. A favorable rail-freight rate on coal from the Birmingham district into New Orleans is proving of considerable advantage, more than 3000 tons of Alabama product going into that market daily now. Alabama operators have been assured that there will be a steady demand for some time to come. The home consumption of coal is also large and steady. Every mining company in the State is adding to its force as quickly as the men can be brought into the district. The North Kentucky Coal and Manufacturing company has been incorporated here with H. M. Morrison, of Ohio, president. The Gulf States Coal Company has been incorporated by Birmingham and Mobile men.

Chicago

Jan. 24—The coal market is in much easier condition, with supplies to this market coming in more freely and the demand for domestic uses somewhat lighter, both features being due to milder weather all over the Middle West. For some coals, however, notably western screenings, the prices remain high; other steam coals are still above normal quotations for winter delivery, although there is a falling tendency as more and more supplies come in. With a continuance of mild weather and large shipments overstocking of the market through too large receipts can easily occur.

Screenings from Illinois and Indiana mines are selling at $2@2.20, run-of-mine from the same source brings $2.30 @2.50 and lump remains $2.75@3.50, lump being least at a premium. The

high prices of fine coals seem to show conclusively that the Chicago market is becoming more and more one for such coals, a tendency that has been noted for a number of months.

Coals from east of Indiana are coming in more freely, in general, but the supply is variable from day to day and the demand is not so variable; consequently prices are fluctuating. Run-of-mine continues to be most in demand, at $3.30@3.50; lump brings $3.75@4; Hocking is steady at $3.15; Youghiogheny sells for $3.25, steam, and $3.30 gas, with about normal conditions. Anthracite demand is less, with chestnut still scarce.

Cleveland

Jan. 24—Car supply and transportation are the chief elements in the trade this week. The local demand is strong, but it is hard to get coal in sufficient quantity to supply customers.

Prices are nominally unchanged, but premiums of 10c. up to 25c. are paid to secure early deliveries, so that it is hard to give definite quotations.

Some tonnage has already been engaged for the Lake trade for next season. Most of it is at rates 5 or 10c. above last year.

Indianapolis

Jan. 24—The coal trade continues active, both for domestic and steam coals. Mines are all busy and are shipping as fast as they can secure cars.

Interest centers on the United Mine Workers' convention, a report of which is given elsewhere. There appears to be a general agreement on the demand for a higher mining scale for next year.

Pittsburg

Jan. 25—The coal market shows greater strength this week; buyers wishing to stock up against a possible suspension of mining April 1 in connection with the wage scale. Prices are not higher, but demand is improved. The car supply is not as bad as last week, but is still not satisfactory, and the movement continues very slow. The official announcement made last week that a 99-year traffic arrangement has been made between the Western Maryland and the Pittsburg & Lake Erie (New York Central) removes any doubt there may have been regarding the assumption that the recent buying of Pittsburg Coal stock was on behalf of the Western Maryland. A 93-mile single-track line will be built between Cumberland, Md., and Connellsville, Penn., connecting the Western Maryland with the Pittsburg, McKeesport & Youghiogheny, which the Pittsburg & Lake Erie leases, affording an outlet to seaboard for freight originating on the Pittsburg & Lake Erie lines, which tap a large portion of the Pittsburg Coal Company properties.

The local coal market is strong, as noted, for mine-run and screened coal, prices remaining at $1.15 for mine-run and nut., $1.25 for ¾-in., and $1.40 for 1¼-in. domestic. Slack, as often happens with a strengthening market for screened coal, is easier, and may be quoted 5c. lower than a week ago, at 85@95c. per ton.

Connellsville Coke—The market has continued dull, uncovered consumers being reserved in making inquiries, while operators are not pressing for business. It seems clear that the uncovered requirements for the half year or year are less than operators estimated in December. Information became available during the week as to furnace-coke contracts made earlier in the month, covering one contract for February-June inclusive, about 25,000 tons monthly, at $2.50 at ovens, and another contract involving about 10,000 tons monthly over the year, at a ratio of seven to one on basic pig iron; that is, furnace coke at ovens is one-seventh the average price of basic pig iron at Valley furnaces, as determined monthly from an average of sales effected in the month. The present market is $17, Valley, which would make $2.43 for the coke.

The market is quotable at $2.50@2.60 for prompt furnace coke, and nominally at about $2.60 for furnace coke on contract, with 72-hour foundry coke at $3@3.15 for prompt and $3.15@3.25 for contract.

The *Courier* reports production in the Connellsville and lower Connellsville region in the week ended Jan. 15 at 457,415 tons, the largest weekly tonnage ever reported; shipments at 5422 cars to Pittsburg, 8130 cars to points west of Pittsburg, and 936 cars to points east of Connellsville, a total of 14,488 cars.

St. Louis

The market for lump coal began to soften last Monday and has been getting weaker daily since. The market has declined about 40c. per ton this week and lump is being offered freely at $1.10@1.20 today. This was due largely to the weather, which has been mild all week. While today the weather is brisk again, it is not enough to stop the downward trend of the market. Not only is the local market off but orders from out of town places do not seem to be coming in like they were a week ago, with the consequence that the premium prices which are being paid for cars that will go out of town have eased up and very little more is being offered for out-of-town coal than for local.

The market on screenings, on the other hand, is a little stiffer than before both for out-of-town and local shipment. The wide differential on screenings which will go out of town is still being maintained.

High-grade coal is in good demand, though the quantity actually coming forward is microscopic. During the last month when prices have been so good, drivers in the mines were scarce. Some operators, in order to get drivers, offered $3 per day while the scale is only $2.56. This has caused dissatisfaction; nearly all the drivers are demanding $3 and many of the mines which have been anxious to run acceded to their demands at once. However, a large number of operators refused to pay above the union scale and the Illinois Operators' Association is having a meeting in Chicago today to straighten this matter out. Unless it is adjusted at once there may be some trouble in the association.

Standard 6-in. lump is $1.75 at mine or $2.27 St. Louis; 2-in. lump is $1.40 at mine or $1.92 St. Louis; mine-run is offered at $1.20 at mine or $1.72 St. Louis; 3-in. nut is $1.10 at mine or $1.62 St. Louis; 1½-in. nut and pea is worth $1 at mine or $1.52 St. Louis. Screenings are worth 70c. at mine or $1.22 St. Louis for local shipment and $1 per ton at mine for Chicago shipment; ¾-in. pea and slack are 50c. at mine or $1.02 St. Louis.

Springfield, Mt. Olive and Staunton 6-in. lump is $2 at mine or $2.52 St. Louis; 2-in. lump is $1.50 at mine or $2.02 St. Louis; mine-run is $1.40 at mine or $1.92 St. Louis; screenings are $1.10 at mine but are all going north or northwest.

Carterville 6-in. lump is $2 per ton at mine or $2.67 St. Louis; 3- to 2-in. nut is $1.90 at mine or $2.57 St. Louis; 1½-in. screenings are $1.10@1.20 at mine or $1.77@1.87 St. Louis. The greater part of the screenings is going to Chicago.

Franklin county 6-in. lump is $2.25 at mine or $2.92 St. Louis; 3-in. nut is $2 at mine or $2.67 St. Louis; 1½-in. screenings are being offered at $1.25 per ton mine but are all going northwest.

Anthracite is in good demand for all sizes and is being readily absorbed. More stove coal has been sold in this market since chestnut has been so scarce than ever before. No deviation is being made from the circular of $6.95 for the smaller sizes and $6.70 per ton for grate.

Foreign Coal Trade

Bunker Coal at United States Ports—Coal furnished to steamships in foreign trade at United States ports, 11 months ended Nov. 30, long tons:

	1908.	1909.	Changes.
Coast ports	5,304,900	5,431,364	I. 126,464
Great Lakes	219,842	224,945	I. 5,103
Total	5,524,742	5,656,309	I. 131,567

Adding the exports, previously reported, makes a total of 16,475,653 tons in 1908, and 17,310,796 in 1909, sold for consumption beyond the limits of the United States.

Transvaal Coal—Shipments of coal from mines in the Transvaal, 11 months ended Nov. 30 were 3,284,081 tons.

Iron Trade Review

New York, Jan. 26—The waiting position which has characterized the iron and steel trades for the last month is still in evidence but there are some signs of its early disappearance, and of a gradual broadening of business.

In pig iron buying is developing gradually in the East both in foundry and basic pig. The Central West is a little behind, however, and business is increasing more slowly. It is noticeable that sellers of pig iron are beginning to weaken a little and are disposed to take orders for second-quarter delivery at current prices instead of asking 25 or 50c. more, as they have been doing for some time.

In finished material business is also improving. Quite a number of orders for structural steel are coming forward. Business in plates is good and in bars still better. Distribution by jobbers and stores to smaller consumers is reported to be active.

United States Steel Corporation—The statement for the fourth quarter of 1909 shows that the net earnings, after deducting all working expenses, maintenance and repairs, were:

	1908.	1909.
October	$ 9,415,668	$14,048,205
November	8,756,729	13,711,765
December	8,053,088	13,211,339
Total	$26,225,485	$40,971,309
Depreciation, reserve funds, etc		$6,570,877
Interest and sinking funds		7,311,963
Total charges		$13,882,840
Surplus for the quarter		$27,088,469

The appropriations from this surplus were $7,637,126 for additions to property and $15,200,213 for dividends; these dividends including the regular 1¾ per cent. on preferred, a regular dividend of 1 per cent. and an extra of ¾ per cent. on the common stock. The balance over all appropriations was $4,251,180. The unfilled orders Dec. 31 were 5,927,031 tons, an increase of 1,130,198 tons over Sept. 30; and 2,323,504 tons over Dec. 31 of the previous year.

Baltimore

Jan. 24—Imports for the past week included 112 bars antimonial lead from Antwerp; 1391 tons ferromanganese, 80 tons silicospiegel and 2000 tons spiegeleisen from Liverpool; 5325 tons manganese ore from Poti, Russia, and 2250 tons from Middlesboro, England; 10,347 tons cupreous pyrites from Huelva, Spain; 26,450 tons iron ore from Cuba.

Birmingham

Jan. 24—Inquiries for pig iron to be delivered on during the third quarter of the present year are being received by Southern furnace companies and a few orders are being booked. The buying is a little more active than it has been, but far from being as strong as had been expected. The aggregate business for the first quarter of the year is good. There is no delay in deliveries and some of the resale iron is still being moved out. The make is a little off, another furnace having to be put out of blast for repairs. The quotations continue to be $14@14.50 per ton No. 2 foundry, with the furnace companies demanding the higher figure. Charcoal iron is in good demand.

Chicago

Jan. 24—The recovery of the iron market has become more apparent in the last week with increased buying of pig iron for all purposes, though the regular foundry trade is doing more inquiring than buying, on second-half needs. For second-quarter deliveries considerable business is being done, and the tone of the market is upward, with a stiffening of prices. Southern, the chief supply for the present market, brings $14@14.50 Birmingham, or $18.35@18.85 Chicago. Northern remains quiet and firm at $19 @19.50, with little available for early deliveries, except upon contracts. On deliveries after the opening of navigation, April 1, the advance of 50c. on ore received by Northern furnaces means an advance of $1 a ton on pig iron. For Lake Superior charcoal there is a good demand at $19.50@20 per ton.

For iron and steel products the market continues to advance, with sales increasing of railroad supplies, structural material, plates, bars and other shapes.

Philadelphia

Jan. 26—The week's dealings in crude iron have failed to realize the expectations of some makers. Based on inquiries made early in the month a number of large sales were counted on. The prospective buyers are still holding off but no reason can be had for the delay. The only transactions worth noting were in forge iron and these were made up of orders for material to cover new business. A fair quotation for No. 2X foundry is $19; gray forge $18; basic $18.50 @19. Some brands of No. 2 foundry can be had at $18. There is no immediate probability of much business.

Scrap—An abundant supply of scrap is promised as soon as it can be delivered. Buyers are awaiting deliveries from yards. Foreign scrap will probably figure to some extent in this market. The best seller at present is heavy melting steel scrap.

Pittsburg

Jan. 25—The iron and steel market is beginning to show signs of a definite trend. Inquiry for pig iron and ferroalloys, like ferromanganese, has shown an actual increase this week over the early part of the month, while in finished steel products the dullness is prolonged and possibly accentuated. In unfinished steel, billets, sheet-bars and rods, claims are made that the market is firm, but information is coming out that shipments are heavy on contracts and that in some cases consumers are holding up deliveries. The quantity of resale steel, already a factor, promises to increase.

Pig Iron—An Erie, Penn., malleable foundry has contracted with a local furnace for 12,000 tons of malleable covering 1500 tons a month over second quarter and 1200 tons a month over second half, at $18, delivered. This would be equivalent to $17.10, f.o.b. Valley furnaces, but they would probably not have met the figure. The Pittsburg market is dull, and prices are hardly more than nominal. Asking figures remain at $17 for No. 2 foundry and basic and $19 for bessemer, f.o.b. Valley furnaces, for prompt and early delivery. The preponderance of opinion is that the market is in line for a slight decline, as after 60 days of quietness consumers naturally expect a concession.

Steel—Quotable prices are unchanged at $27@27.50 for bessemer billets, $27.50 @28 for open-hearth and $28.50@29 for sheet-bars, rods being $33, all prices f.o.b. maker's mill, Pittsburg district. It is reported that the Pennsylvania Steel Company is considering the abandonment of rail manufacture at Steelton, for billets and finished products outside of rails, and will concentrate rail manufacture at the Baltimore mill.

Ferromanganese—While there is more inquiry, prices are easier by 50c., at $44, Baltimore, for prompt or delivery in the next two or three months.

Sheets—Mills are rather slow at accepting new business, being well filled. It would probably require three or four months, on an average, to clean up business now on books. Black sheets remain at 2.40c and galvanized at 3.50c., both 28 gage, with corrugated roofing at $1.70 per square for painted and $3 for galvanized. Blue annealed sheets have cut entirely loose from the price of 1.75c. for 10 gage made by the leading interest, as it is sold to July 1 and will not quote for third quarter. Only one independent mill is able to make reasonable deliveries, its price being 1.90c., at which we quote the market.

St. Louis

Jan. 24—The past week has been one of the most uneventful in regard to pig iron than has been experienced in a long time. Scarcely a contract worth mentioning has been written up by any St. Louis concern. This is just a local depression and is expected that pig iron will pick up next month. Prices are firm at $15 per ton Birmingham, or $18.75 St. Louis for No. 2 foundry.

Metal Markets

New York, Jan. 26—The metal markets generally continue quiet and rather uninteresting. Consumptive demand is good, but supplies are abundant.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal.	Exports.	Imports.	Excess.
Gold:			
Dec. 1909..	$10,579,304	$ 2,083,772	Exp. $ 8,495,532
" 1908..	7,357,707	5,152,732	" 2,204,975
Year 1909..	132,880,821	44,086,966	" 88,793,855
" 1908..	81,215,456	50,276,293	" 30,939,163
Silver:			
Dec. 1909..	5,297,965	4,167,276	Exp. 1,130,689
" 1908..	4,726,289	4,409,454	" 316,835
Year 1909..	57,592,309	46,151,282	" 11,441,027
" 1908..	51,837,671	42,224,130	" 9,613,541

Exports from the port of New York, week ended Jan. 22: Gold, $1,403,200, chiefly to Argentina; silver, $1,403,901, principally to London. Imports: Gold, $63,939; silver, $25,417, both chiefly from the West Indies and South America.

Gold—The demand for gold on the open market in London has not been excessive and prices remain at 77s. 9d. per oz. for bars, and 76s. 5d. per oz. for American coin. Most of the current supplies went to the Bank of England. In New York gold is still going to South America on London account.

Platinum—Business is quiet and dealers quote $28.50@29 per oz. for refined platinum and $34.50 for hard metal.

Our special correspondent writes from St. Petersburg, under date of Jan. 6, that there has been very little business, owing to the Christmas holidays. Quotations at Ekaterinburg were 5.50 rubles per zolotnik—equal to $20.68 per oz.—for crude metal, 83 per cent. platinum; at St. Petersburg, 23,000@23,500 rubles per pood—average, $22.79 per oz. These prices are nominal and subject to negotiation.

Silver—The market has continued steady on buying for both India and China, and closes firm at 24⅛d. in London.

SILVER AND STERLING EXCHANGE

Jan.	20	21	22	24	25	26
New York....	52¼	52¼	52⅜	52⅜	52¼	52¼
London . ..	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛
Sterling Ex..	4.8650	4.8650	4.8625	4.8625	4.8645	4.8650

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

Exports of silver from London to the East, Jan. 1 to Jan. 13, as reported by Messrs. Pixley & Abell:

	1909.	1910.	Changes.
India.....	£ 106,100	£423,000	I. £ 316,900
China.....	80,000	57,000	D. 23,000
Straits.....	.....	.....	.....
Total.....	£ 186,100	£480,000	I. £ 293,900

Average price of India Council bills in London for the week was 16.09d. per rupee.

Gold and silver movement in France, 11 months ended Nov. 30:

	Imports.	Exports.	Excess.
Gold..Fr.	378,422,000	F.177,096,000	Imp.Fr.201,326,000
1908..	885,568,000	21,898,000	Imp. 863,670,000
Silver.	135,467,000	115,381,000	Imp. 20,086,000
1908..	140,018,000	137,893,000	Imp. 2,125,000

Imports of nickel and copper coins, 68,000 fr. in 1908, and 72,000 fr. in 1909; exports, 731,000 fr. in 1908, and 1,125,000 fr. last year.

Copper, Tin, Lead and Zinc

	Copper.			Tin.	Lead.		Zinc.
Jan.	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.	Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.	St. Louis, Cts. per lb.
20	13¾ @14	13½ @13⅝	60 7/16	32⅝	4.70	4.55 @4.60	5.90 @5.95
21	13¾ @14	13½ @13⅝	60½	32¼	4.70	4.52½ @4.57½	5.90 @5.95
22	13¾ @14	13½ @13⅝	....	32¼	4.70	4.52½ @4.57½	5.90 @5.95
24	13⅝ @13⅞	13⅝ @13⅝	60¾	32⅝	4.70	4.50 @4.55	5.90 @5.95
25	13⅝ @13⅞	13⅝ @13⅝	60½	32¾	4.70	4.50 @4.55	5.87½ @5.92½
26	13⅝ @13⅞	13½ @13⅝	60½	32¾	4.70	4.50 @4.55	5.87½ @5.90

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

Copper—Although manufacturers both in this country and in Europe are very busy, they have naturally kept out of the market during the great weakness in Wall Street. On the other hand, producers being well sold ahead have not pressed sales, although electrolytic copper has been freely offered and sold to some extent at 13¾, delivered, 30 days, which is equivalent to about 13.60c., cash, New York. Since Monday some speculative lots have been sold at slightly lower prices, which have also been accepted by some first hands who were evidently testing the market. Sales of Lake copper since Jan. 19 have been insignificant, and quotations for this kind of metal are merely nominal. On Jan. 26 there was a slight recovery. At the close electrolytic is quoted at 13½@13⅝c., while Lake is nominally 13⅝@13⅞c. Casting copper is quoted nominally at 13¼@13½c. as the average for the week.

Copper sheets are 18@19c. base for large lots. Full extras are charged, and higher prices for small quantities. Copper wire is 15½c. base, carload lots at mill. Business is very good.

The market in London for standard copper has been firm, particularly considering the dullness of the refined article and the weakness in the New York stock market. Prices have fluctuated within narrow limits and at the close spot is quoted at £60 10s. and three months at £61 7s. 6d.

Refined and manufactured sorts are quoted: English tough, £64; best selected, £64@64 10s.; strong sheets, £74@75 per ton.

Copper exports from New York and Philadelphia for the week were 5268 long tons. Our special correspondent gives the exports from Baltimore at 1741 tons.

Tin—The London market was without special features during the week. Operators prefer to keep the market quiet whenever a Banka sale takes place. There is one scheduled for today, and after it is over there may be more activity. The domestic market continues as dull and uninteresting as it has been for quite some time. The only feature of interest is the premium exacted for spot material, notwithstanding the fact that the visible supplies on this side are fairly large. The London market closes at £147 for spot, and £148 7s. 6d. for three months, while in this market tin is quoted at 32¾ cents.

Lead—The market is quiet. Lead at New York is unchanged at 4.70c., but at St. Louis somewhat lower prices have been made, and at the close 4.50@4.55c. is quoted.

The London market is steady, Spanish lead being quoted at £13 12s. 6d. and English lead at £13 15s. per ton.

Spelter—There has been little demand, and as some metal was pressed for sale prices have declined, and close at 5.87½@5.90c. St. Louis, and 6.02½@6.05c. New York.

New York quotations for spelter Jan. 20-24, inclusive, were 6.05@6.10c.; Jan. 25, 6.02½@6.07½c.; Jan. 26, 6.02½@6.05 cents.

The London market is unchanged at £23 5s. for good ordinaries, and £23 10s. for specials.

Base price of sheet zinc is now 8c. per lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

Other Metals

Antimony—The market remains quiet, and only a small business is being done. In the absence of large sales prices are nominally unchanged. Cookson's may be quoted at 8½c. per lb., and U. S. 8c., with 7⅝@7⅞c. named for outside brands.

Aluminum—The current price of aluminum is 20@23c. per lb. for ingots. The higher price is that asked by the American producer.

Quicksilver—The market remains steady and firm. New York quotations

are $52.50 per flask of 75 lb.; jobbers ask 72@75c. per lb. for small lots. The San Francisco price remains at $50.50@51.50 for domestic orders and $2 per flask less for export. The London price is £9 15s. per flask; jobbers are quoting 2s. 6d. per flask less.

Nickel—Large lots, contract business, 40@45c. per lb. Retail spot, from 50c. for 200-lb. lots, up to 55c. for 500-lb. lots. The price for electrolytic is 5c. higher.

Magnesium—The price of pure metal is $1.50 per lb. for 100-lb. lots f.o.b. New York.

Cadmium—Current quotations are 65@70c. per lb. in 100-lb. lots at Cleveland, Ohio. In Germany 450@475 marks per 100 kg., at factory in Silesia.

British Metal Imports and Exports

Imports and exports of metals in Great Britain, year ended Dec. 31, figures in long tons, except quicksilver, which is in pounds:

Metals:	Imports.	Exports.	Excess.
Copper, long tons	173,216	63,661	Imp. 109,555
Copper, 1908....	165,972	68,820	Imp. 97,152
Tin, long tons....	41,725	41,413	Imp. 312
Tin, 1908.....	47,730	42,103	Imp. 5,627
Lead, long tons..	207,660	45,904	Imp. 161,756
Lead, 1908	237,508	49,428	Imp. 188,080
Spelter, l'g tons..	121,552	8,567	Imp. 112,985
Spelter, 1908....	108,523	8,402	Imp. 100,121
Quicksilver, lb...	3,237,321	1,653,868	Imp. 1,583,453
Quicksilver, '08	3,270,412	1,676,167	Imp. 1,596,245
Ores:			
Tin ore and con.	24,082	.....	Imp. 24,082
Tin ore, 1908..:	25,013	.....	Imp. 25,013
Pyrites	791,078	.....	Imp. 791,078
Pyrites, 1908...	758,910	.....	Imp. 758,910

Copper totals include metallic contents of ore and matte. Exports include re-exports of foreign material. Of the imports in 1909 the United States furnished in all 236 tons copper matte, 70,065 tons fine copper and 33,404 tons lead. This lead was chiefly Mexican, refined in this country.

Zinc and Lead Ore Markets

Platteville, Wis., Jan. 22—The base price paid this week for zinc ore was $47@48 per ton; lead ore, $56@60 per ton.

SHIPMENTS, WEEK ENDED JAN. 22.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Mineral Point.....	420,000	.....	553,000
Platteville.....	199,400	.....	101,670
Cuba City.....	386,767	91,160	.....
Benton.....	177,050	.....	.....
Council Hill.....	80,000	.....	.....
Harker.....	70,500	.....	.....
Rewey	61,000	.....	.....
Montfort.....	50,000	.....	.....
Linden.....	.....	64,450	.....
Total.....	1,444,717	125,610	645,670
Year to Jan. 22.....	3,666,247	350,169	832,870

In addition to the above there was shipped to the separating plants 951,345 lb. zinc concentrates during the week.

Joplin, Mo., Jan. 22—The highest price paid for zinc sulphide ore this week was $51, the base being $46@48 per ton of 60 per cent. zinc. Zinc silicate sold on a base of $26@28 per ton of 40 per cent. zinc. The average price, all grades, was $44.94. Lead ore sold as high as $58 and this figure was generally paid for the bulk of this mineral, with deductions for ore that did not grade up to an 80 per cent. standard. The average price, all grades, was $56.06 per ton.

The shipment of zinc ore was an increase of 747 tons over last week, but is still over 100 tons under an average of last year's weekly shipments. The decision of some companies to sell the lead stock on hand in preference to accepting a reduction in the price of zinc increased lead purchases for immediate and future delivery, buyers being in the market to take all ore salable at $58 per ton, being busy until a late hour tonight.

SHIPMENTS, WEEK ENDED JAN. 22.

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	5,149,630	786,810	$141,257
Joplin.....	1,950,870	554,620	61,929
Galena.....	787,800	93,690	20,842
Miami.....	436,470	28,540	9,528
Duenweg.....	442,360	5,160	9,047
Quapaw.....	361,500	28,180	8,742
Alba-Neck.....	296,720	23,720	7,944
Badger.....	321,220	.....	7,548
Granby	405,800	5,000	6,375
Aurora.....	341,900	.....	6,336
Spurgeon.....	141,450	100,000	4,989
Carthage.....	184,770	.....	4,526
Carl Junction.....	139,740	.....	4,121
Stott City.....	134,050	.....	3,150
Sarcoxie.....	53,220	.....	1,250
Totals	11,147,500	1,625,720	$297,584
4 weeks.....	38,510,270	6,436,160	$1,063,761
Zinc value, the week,	$250,558;	4 weeks,	$877,547
Lead value, the week,	47,026;	4 weeks,	186,114

MONTHLY AVERAGE PRICES

Month.	Zinc Ore. Base Price.		Zinc Ore. All Ores.		Lead Ore. All Ores.	
	1908.	1909.	1908.	1909.	1908.	1909.
January.....	$37.60	$41.25	$35.56	$38.46	$46.88	$52.17
February....	36.63	36.94	34.92	34.37	49.72	50.50
March.....	36.19	37.40	34.19	34.71	49.90	50.82
April.....	35.40	38.63	34.08	37.01	52.47	55.63
May	34.19	40.06	33.39	37.42	56.05	56.59
June.....	33.06	44.15	32.07	40.35	60.48	57.52
July	34.55	43.06	31.67	41.11	59.90	53.74
August	36.53	48.25	33.42	44.54	60.34	57.60
September ..	37.63	47.70	34.44	44.87	54.59	56.11
October.....	35.95	49.50	33.28	45.75	52.63	55.02
November...	39.13	51.31	35.02	48.29	54.53	53.94
December...	42.75	49.45	39.63	47.57	49.68	55.26
Year.....	$36.63	43.98	$34.31	41.20	$53.93	54.60

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

Chemicals

New York, Jan. 26—The market remains generally quiet, with a fair amount of new business.

Copper Sulphate—Prices are unchanged at $4.10 per 100 lb. for carload lots, and $4.25 per 100 lb. for smaller parcels.

Nitrate of Soda—On a moderate business the prices of this article are steady at 2.10c. per lb. for spot and 2.07½c. per lb. for futures.

Arsenic—Sales have been a little larger, some 300 tons changing hands during the week. Prices are lower, $2.50 per 100 lb. being quoted for white arsenic.

Sulphur—Parsons & Petit, New York, report the arrival this week of a cargo of 950 tons Sicilian crude brimstone, of which 250 tons will be unloaded at New York and 700 tons at Baltimore.

Mining Stocks

New York, Jan. 26—Business on the Stock Exchange was demoralized early in the week by the sudden collapse of the Hocking Coal and Iron pool; an incident which is being investigated by the Exchange authorities. This was followed by a weak market, prices of many securities declining while trading was only in moderate volume. The close is almost at the lowest points.

On the Curb trading followed very much the same lines. Business decreased and prices declined. The copper stocks especially felt the weakness and showed declines all along the list, but on quite moderate trading. The Amalgamated Copper directors at their meeting made no change in the dividend, declaring ½ per cent. for the quarter.

Speculation in Steel Corporation stocks was active on rumors of an increased dividend on the common. The dividend declared yesterday was 1 per cent., quarterly, with an extra dividend of ¾ per cent., which with 3¼ per cent. already paid will make up a total of 4 per cent.

Boston Jan. 25—Copper stocks are having their reactions but not until after record prices had been named in Lake, North Lake and Indiana shares. Attention is being diverted to the Lake Superior issues almost to the exclusion of the others. Calumet & Arizona has been the weak feature and recorded a $30 break during the week to $6 with some slight recovery from this. The street is much perplexed over this slump and accounts for it in two ways; a decline in the copper contents of the rock and the fact that the Cole-Ryan contingent has disposed of its holdings and no longer has a voice in the management.

Lake Copper fluctuated widely but struck a new high on Jan. 22 at $94.50 A third mill test came disappointing and the stock broke to $74. Whereas the two previous mill runs yielded 82 and 80 lb. of mineral to the ton of rock stamped, the third showed but 69 lb. of mineral. North Lake touched $19.50, but fell back to $12.75 today. Indiana, after soaring to $38 on the Curb, fell back to $27 again, but fluctuations have been more even the past few days.

South Lake and Oneco also attracted considerable attention on the Curb. Realizing profits in the former causes a decline from $15.25 to $8.50, while Oneco had a market move from $6.75 to $9

and back to just above $7 again. The liquidation in the New York market brought sympathetic weakness in the local copper share list and prices declined quite severely today throughout the list.

Curb stocks have followed pretty closely the run of the general market.

STATISTICS OF COPPER.

Month.	United States Product'n.	Deliveries, Domestic.	Deliveries for Export.
I	112,135,200	51,862,624	38,499,797
II	103,700,817	43,578,118	30,968,496
III	117,058,661	48,871,964	59,191,043
IV	113,574,292	47,546,010	65,110,111
V	118,356,146	61,163,325	70,542,753
VI	116,567,493	60,591,116	70,966,457
VII	118,277,603	75,520,083	75,018,974
VIII	120,597,234	59,614,207	48,382,704
IX	118,023,139	52,105,955	50,077,777
X	124,657,709	66,359,617	56,261,238
XI	121,618,369	66,857,873	55,266,595
XII	117,828,655	69,519,501	59,546,570
Totals	1,405,403,056	705,051,591	680,942,620

VISIBLE STOCKS.

	United States.	Europe.	Total.
I	122,357,266	124,716,480	247,073,746
II	144,130,045	118,574,400	262,704,445
III	173,284,248	117,140,800	290,425,048
IV	182,279,902	115,024,000	297,303,902
V	183,198,073	114,050,320	297,248,393
VI	169,848,141	127,352,960	297,201,101
VII	154,858,061	150,928,960	305,787,021
VIII	122,596,607	171,492,160	294,088,767
IX	135,196,930	197,993,600	333,190,530
X	151,472,772	210,224,000	361,696,772
XI	153,509,626	222,566,400	376,076,026
XII	153,003,527	236,857,600	389,861,127
I, 1910	141,766,111	244,204,800	385,970,911

Figures are in pounds of fine copper. U. S. production includes all copper refined in this country, both from domestic and imported material. Visible stocks are those reported on the first day of each month, as brought over from the preceding month.

Monthly Average Prices of Metals

SILVER

Month.	New York. 1908.	New York. 1909.	London. 1908.	London. 1909.
January	55.678	51.750	25.738	23.834
February	56.000	51.472	25.855	23.706
March	55.365	50.468	25.570	23.227
April	55.505	51.428	25.133	23.708
May	52.795	52.905	24.377	24.343
June	53.663	52.538	24.760	24.166
July	53.115	51.043	24.514	23.519
August	51.683	51.125	23.858	23.588
September	51.720	51.440	23.877	23.743
October	51.431	50.923	23.725	23.502
November	49.647	50.703	22.933	23.351
December	48.766	52.226	22.493	24.030
Total	52.864	51.502	24.402	23.726

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

COPPER

	NEW YORK. Electrolytic 1908.	Electrolytic 1909.	Lake. 1908.	Lake. 1909.	LONDON. 1908.	LONDON. 1909.
January	13.726	13.893	13.901	14.280	62.386	61.198
February	12.905	12.949	13.098	13.295	58.786	57.688
March	12.704	12.387	12.875	12.826	58.761	56.231
April	12.743	12.56⅛	12.928	12.93⅞	58.331	57.363
May	12.598	12.893	12.788	13.238	57.387	59.338
June	12.675	13.214	12.877	13.548	57.842	59.627
July	12.702	12.880	12.933	13.363	57.989	58.556
August	13.462	13.007	13.639	13.296	60.500	59.393
September	13.388	12.870	13.600	13.210	60.338	59.021
October	13.354	12.700	13.646	13.030	60.139	57.551
November	14.130	13.125	14.386	13.354	63.417	58.917
December	14.111	13.298	14.411	13.647	62.943	59.906
Year	13.208	12.982	13.424	13.335	59.902	58.732

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

TIN AT NEW YORK

Month.	1908.	1909.	Month.	1908.	1909.
January	27.380	28.060	July	29.207	29.125
February	28.978	28.290	August	29.942	29.966
March	30.577	28.727	September	28.815	30.293
April	31.702	29.445	October	29.444	30.475
May	30.015	29.225	November	30.348	30.859
June	28.024	29.322	December	29.154	32.913
			Av. year	29.465	29.725

Prices are in cents per pound.

LEAD

Month.	New York. 1908.	New York. 1909.	St. Louis 1909.	London. 1908.	London. 1909.
January	3.691	4.175	4.025	14.469	13.113
February	3.725	4.018	3.868	14.250	13.313
March	3.838	3.986	3.835	13.975	13.438
April	3.993	4.168	4.051	13.469	13.297
May	4.253	4.287	4.214	12.938	13.225
June	4.466	4.350	4.291	12.600	13.031
July	4.744	4.321	4.188	13.000	12.563
August	4.580	4.363	4.227	13.375	12.475
September	4.515	4.342	4.215	13.125	12.781
October	4.351	4.341	4.215	13.375	13.175
November	4.330	4.370	4.252	13.538	13.047
December	4.213	4.560	4.459	13.166	13.125
Year	4.200	4.273	4.153	13.439	13.049

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month.	New York. 1908.	New York. 1909.	St. Louis. 1908.	St. Louis. 1909.	London. 1908.	London. 1909.
January	4.518	5.141	4.363	4.991	20.563	21.425
February	4.788	4.889	4.638	4.739	20.875	21.563
March	4.665	4.757	4.527	4.607	21.075	21.438
April	4.645	4.965	4.495	4.815	21.344	21.531
May	4.608	5.124	4.458	4.974	19.906	21.975
June	4.543	5.402	4.393	5.252	19.000	22.000
July	4.485	5.402	4.338	5.252	19.031	21.969
August	4.702	5.729	4.556	5.579	19.350	22.125
September	4.769	5.796	4.619	5.646	19.563	22.906
October	4.801	6.199	4.651	6.043	19.750	23.200
November	5.059	6.381	4.909	6.231	20.875	23.188
December	5.137	6.249	4.987	6.099	20.625	23.094
Year	4.726	5.503	4.578	5.352	20.163	22.201

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

STOCK QUOTATIONS

COLO. SPRINGS Jan. 25

Name of Comp.	Bid.
Listed:	
Acacia	.06
Cripple Cr'k Con.	.03
C. K. & N.	.11
Doctor Jack Pot	.08¼
Elkton Con.	.70½
El Paso	.66½
Fannie Rawlins	.67½
Findlay	.11
Gold Dollar	.11
Gold Sovereign	.04¼
Isabella	.18
Mary McKinney	.47½
Pharmacist	.04
Portland	.90½
Vindicator	.75
Work	.06⅛
Unlisted:	
Golden Cycle	1.40
United Gold Mines	.10

S. LAKE CITY Jan. 25

Name of Comp.	Clg.
Carisa	.50
Colorado Mining	.78
Columbus Con	.76
Daly Judge	4.40
Grand Central	1.80
Iron Blossom	.83
Little Bell	1.80
Little Chief	‡.45
Lower Mammoth	‡.50
Mason Valley	2.25
Maj. Mines	‡2.32½
May Day	‡.19½
Nevada Hills	.60
New York	‡.13
Prince Con	.93
Red Warrior	‡6.00
Silver King Coal'n	3.56
Sioux Con	.35
Uncle Sam	.46½
Victoria	1.50

SAN FRANCISCO. Jan. 25.

Name of Comp.	Clg.
COMSTOCK STOCKS	
Atlanta	‡.11
Belcher	1.30
Best & Belcher	.76
Caledonia	.46
Challenge Con	.30
Chollar	‡.32
Confidence	1.35
Con. Cal. & Va	1.75
Crown Point	1.27½
Exchequer	‡.30
Gould & Curry	.38
Hale & Norcross	.59
Mexican	1.75
Ophir	2.05
Overman	.65
Potosi	.66
Savage	.43
Sierra Nevada	.71
Union	.81
Yellow Jacket	‡1.30

Name of Comp.	Clg.
MISC. NEVADA	
Belmont	1.35
Jim Butler	.10
MacNamara	.27
Midway	.27
North Star	.01
West End Con	.23
Atlanta	.10
Booth	.09
C.O.D. Con	.06
Columbia Mt.	.05
Comb. Frac.	.31
Goldfield Belmont	.90
Goldfield Daisy	.98
Jumbo Extension	.23
Oro	.03
Red Hill	.03
Sandstorm	.04
Silver Pick	.07
St. Ives	.12

N. Y. EXCH. Jan. 25

Name of Comp.	Clg.
Amalgamated	77¾
Am. Agri. Chem.	43½
Am.Sm.&Ref.,com	89¼
Am. Sm. & Ref., pf.	108
Anaconda	49⅛
Bethlehem Steel	30½
Col. & Hock. C. & I.	21
Colo. Fuel & Iron	39⅞
Du Pont P'd'r, pf.	86
Federal M. & S.	85
Great Nor., ore ctf.	70¾
Nat'nal Lead, com.	81½
National Lead, pf.	‡109
Pittsburg Coal	20½
Republic I&S, com.	36¾
Republic I & S, pf.	100
SlossSheffi'd, com.	77
Sloss Sheffield, pf.	118½
Tennessee Copper	33⅜
Utah Copper	49⅛
U. S. Steel, com.	82¼
U. S. Steel, pf.	121½
Va. Car. Chem.	50⅜

N. Y. CURB Jan. 25

Name of Comp.	Clg.
Big Vein Copper	8⅞
Bonanza Creek	3
Boston Copper	17⅝
Braden Copper	4⅜
B. C. Copper	7¼
Buffalo Mines	3½
Butte Coalition	25¼
Chino Copper	12¼
Cobalt Central	.16
Combination Fra.	.32
Con. Ariz. Sm.	2⅛
Cumberland Ely	9
Davis-Daly	3⅝
Dominion Cop.	7
Ely Con	.82
El Rayo	2¾
Florence	2⅜
Gila Copper	8⅜
Giroux	9⅝
Gold Hill	1¾
Goldfield Con.	7⅜
Greene Cananea	9¼
Guanajuato	2
Guggen. Exp.	241½
Kerr Lake	.09
La Rose	4⅜
McKinley-Dar-Sa.	.75
Miami Copper	23⅜
Mines Co. of Am.	50
Montezu. of C. R.	3½
Mont. Shoshone	1/16
Mont.-Tonopah	.70
Nev. Utah M. & S.	1⅝
Newhouse M. & S.	3½
Nipissing Mines	10
Ohio Copper	4⅝
Pacific Sm. & M.	1/16
Silver Queen	.20
Standard Oil	638
Stewart	5/8
Tonopah	6½
Tonopah Ex.	.76
Tri-Bullion	1
Utah Apex	5⅛
Yukon Gold	4¾

LONDON Jan 26

Name of Com.	Clg.
Dolores	£1 10s 0d
Stratton's Ind.	0 3 3
Camp Bird	1 8 6
Esperanza	3 0 9
Tomboy	0 17 6
El Oro	1 8 0
Oroville	0 9 0

BOSTON EX. Jan. 25

Name of Comp.	Clg.
Adventure	8¼
Allouez	47
Am. Zinc	31½
Arcadian	8
Arizona Com	41
Atlantic	10
Boston Con	17¾
Calumet & Ariz.	65
Calumet & Hecla.	640
Centennial	30
Con. Mercur	.12
Copper Range	79
Daly-West	‡9
East Butte	10½
Franklin	18
Greene—Can.	9⅜
Hancock	21
Isle Royal	22½
Keweenaw	4¼
La Salle	16
Mass	7¼
Michigan	7
Mohawk	68
Nevada	23¼
North Butte	40½
Ojibway	9⅝
Old Dominion	45
Osceola	155
Parrot	20
Quincy	‡88¼
Shannon	14¾
Superior	56
Superior & Bost.	15
Superior & Pitts.	13
Tamarack	63
Trinity	9¼
U. S. Smg. & Ref.	46¼
U.S.Sm. & Rc., pd.	50¾
Utah Con	41
Victoria	4¾
Winona	10
Wolverine	144
Wyandotte	2½

BOSTON CURB

Name of Comp.	Clg.
Ariz. Mich	.95
Ahmeek	218
Bingham Mines	3½
Boston Ely	4⅛
Calaveras	6⅛
Champion	.10
Chemung	11¾
Chino	12⅜
Corbin	.10¾
Cactus	5⅛
Crown Reserve	5⅛
First Nat. Cop.	5
Gila Copper	‡9¾
Indiana	29½
Majestic	.91
Ray Central	3½
Ray Con	23
Rawhide Coal	.16
Rhode Island Coal	‡11½
San Antonio	8½
South Lake	9
Trethewey	..
Vulture	8⅝
Yuma	1/16

ST. LOUIS Jan. 22

N. of Com.	High.	Low.
Adams	.40	.30
Am. Nettie	.09	.07
Center Cr'k	2.00	1.75
Cent.C.&C.	86.00	85.00
C.C. & C. pf.	85.00	84.00
Cent. Oil	105.00	100.00
Columbia	9.00	7.00
Con. Coal	20.00	18.00
Doe Run	110.00	100.00
Gra. Bimet.	.33	.30
St. Joe	13.00	12.00

‡Last quotation.

Assessments

Company.	Delinq.	Sale.	Amt.
Adventure Con. Cop., Mich.		Feb. 1	$1.00
Arcadian Copper, Mich.		Mar. 1	0.50
Bullion, Nev		Jan. 11	Mar. 1	0.05
Con. Imperial, Nev.	Jan. 11	Feb. 3	0.01
Con. Virginia, Nev.	Dec. 20	Jan. 10	0.25
Exchequer, Nev.	Dec. 15	Jan. 5	0.05
Gordon M. & M., Utah	Jan. 15	Feb. 4	0.002
Hancock Min., Mich.		Feb. 1	1.00
Maxfield, Utah	Jan. 31	Feb. 19	0.00½
Palmyra G. & C., Utah	Dec. 29	Jan. 19	0.002
Precious Metals M. & M., Cal.	Dec. 27	Jan. 31	0.01
Reindeer C. & G., Ida.	Dec. 31	Jan. 19	0.003
Savage, Nev.	Feb. 10	Mar. 8	0.10
Seven Bros.-Pioche, Nev.	Jan. 15	Feb. 4	0.002
Sheba Gold & Silver, Utah	Jan. 19	Feb. 23	0.05
Sierra Nevada, Nev.	Jan. 11	Feb. 3	0.10
Silver Hill, Nev.	Dec. 23	Jan. 14	0.05
Silver King Con., Utah	Jan. 17	Feb. 5	0.10
Union Con., Nev.	Dec. 22	Jan. 13	0.10
Utah Ideal, Utah	Feb. 1	Feb. 20	0.00½
Western Monitor, Utah	Feb. 1	Mar. 1	0.00½