Issued Weekly by the
Hill Publishing Company
JOHN A. HILL, Pres. and Treas. ROB'T MCKEAN, Sec'y.
505 Pearl St., New York.
6 Bouverie St., London, E. C.
Unter den Linden 71, Berlin.

Subscriptions payable in advance, $5.00 a year for 52 numbers, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii, or the Philippines, $6.50 in Canada.

To foreign countries, including postage, $8.00 or its equivalent, 33 shillings: 33 marks: or 40 francs.

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

Advertising copy should reach New York Office by Thursday of week before date of issue.

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

Cable Address, Engminjour, N. Y.

CIRCULATION STATEMENT

Of this issue 10,000 *copies are printed.*

None sent free regularly, no returns from news companies, no back numbers. Figures are live, net circulation.

The Engineering and Mining Journal

Vol. 92. DECEMBER 2, 1911. No. 23.

Contents

The Situation in Spelter

The remarkable situation that has lately existed in the spelter industry continues without material change; of course, nothing is immediately to be expected. There will, however, be naturally a working toward easier conditions, which will be better for general welfare, including that of those smelters who are finding a keen enjoyment and a very handsome profit in the situation. We do not begrudge them their profit, because on the whole the smelters do not travel an easy road and generally enjoy a fat year only after a succession of lean ones, to which the record of defunct concerns bears witness. But if the fat year is made the occasion of an orgy there are apt to be disagreeable consequences.

This is not to say that the smelters are to blame for the present combination of circumstances, which have developed by the natural march of events. In the first place smelting capacity suffered by the dwindling of natural gas supply in Kansas. Then the ability of the smelters to secure Western ore on very profitable terms, especially the low-grade Leadville calamine, still further diverted them from the use of high-grade Joplin ore and correspondingly decreased the quantity of spelter made. Smelting capacity has been still further absorbed by furnaces running on bonded ore, a deprivation of domestic consumers that is due to the unfortunate tariff impositions.

Although this situation has been to the great advantage of the smelters, it has not been enjoyable to either the consumers or to the miners of ore, the latter not having participated proportionately in the advance in spelter for the reason that they have been offering such an abundant supply of ore. This very abundance is the chief element of unsoundness in the present situation, the present shortage of spelter being of a different nature from a shortage arising from a scarcity of ore supply, which is apt to be ameliorated but slowly. The addition of smelting capacity is comparatively simple when the plants exist, and in this respect we are much better off than if the present condition had developed last spring, two new works having been constructed in Oklahoma in the meanwhile. Additional blocks will, of course, be added to all of the Oklahoma plants, which still possess an ample gas supply, and that can be done in a few months. In the meanwhile some of the old coal smelteries will be fired up. By and by some of the new works in Illinois will be ready and with these assistances the price for spelter will come down to a moderate basis.

The greatest danger to the smelters is that their present extraordinary profits will lead to an over-building of capacity, with the disagreeable results that follow that. A saving condition lies perhaps in the less ability to secure a gas supply and the large investment that must be made in a modern smelting works in Illinois, which are deterrents to the enterprise of reckless adventurers in the zinc-smelting business. Anyway, it is the consumer himself who is largely responsible for the recent elevation in the price for spelter.

The Miami Mines, Arizona

An event of last week, that is both of interest and importance, was the purchase by John D. Ryan of the control of the Live Oak Development Company, of the Miami district, Ariz. The circumstances of the transaction were rather spectacular, negotiations having been pending with the Miami Copper Company when Mr. Ryan stepped in and concluded his business within 24 hours. Following this consummation plans for a combination between Like Oak and Inspiration were entered into and doubtless will be effected in the near future. This will bring the control of the four mines of the Miami district into two hands, the Lewisohn interests having the Miami and Keystone companies, and

probably all will be brought under one management at some time.

There are several reasons why this would be advantageous. The mining of the orebody which runs through the four properties can be done more economically if prosecuted under a general system, the concentrates of the several mines can be desirably combined for smelting, and a great deal of capital outlay can be saved by the utilization of facilities that have already been provided. It is not to be doubted that the present managements are fully alive to these conditions, and others. The only factor that is likely to delay a consolidation is inability to agree upon terms, such as put an end to the Miami-Inspiration negotiations last spring.

The advent of Mr. Ryan into the field of porphyry mining is especially noteworthy, some of his engineers having been, heretofore, skeptical respecting the claims for the mines of this class. There has been, however, a gradual change of sentiment on their part. The Live Oak is undoubtedly taken over on its merits, but Mr. Ryan was no doubt further animated by a desire to add to the supply of crude copper to be refined at the Raritan works. From this standpoint the recent transaction is not likely to be regarded favorably in the offices of the American Smelting and Refining Company, which is now building a large smeltery at Hayden that will be of capacity superior to the probable supply of Ray concentrates and possibly had in view the smelting of some from the Miami district.

The History of the Mesabi

The testimony given by Mr. Merritt before the Stanley committee in relation to the first opening of the iron mines of the Mesabi range, brought out nothing that has not been known in the Lake country for 20 years past. That the Merritts were not the first to point out the probable existence of iron ore in Northern Minnesota is a matter of history; but it is certain that they were among the first, if not the first, of the explorers to determine for themselves the existence of workable bodies of ore.

The Merritts unfortunately lacked the capital for developing their lands and building the railroad needed to make them accessible. They secured only a part of it locally, and finally had to go where money was to be had practically without limit. That the capitalist who made the advances finally absorbed the property, to his own great profit, was only a repetition of the experience of many other prospectors and discoverers. It is only fair to say, however, that the Rockefeller representatives claim that a final settlement was made with the Merritts which they accepted as satisfactory.

Twenty-five years ago the Mesabi was an unsolved problem; if the range offered great opportunities, there were also great risks to be run. The first developments were tentative and were loosely and unsystematically made. There had been none of the careful and systematical exploration which has since been developed. Even the value of the ore was doubtful, and more than one ironmaster turned down the first shipments. The discoverers believed in it; but to convert this belief into working capital was quite another matter. As was said in the first place, the evidence given revealed nothing which has not been of common knowledge for years, though possibly, it was colored a little by the realization of the great fortune which the witnesses had missed. That would be only human nature.

State Aid to Prospectors

The report of the Secretary for Mines of South Australia gives some interesting figures on the result of state aid for struggling mines. Loans are made to assist in the development of promising prospects, repayment to be made by application of 50 per cent. of the profits. Up to June 30, 1911, aid was extended to 108 companies, of which two only repaid their loans out of profits. In other cases the state sold the mining machinery and applied the proceeds toward the debt, full payment of six other loans being secured in this way. In 17 cases partial repayments were made. The total amount advanced was £53,822, the total repayments amounted to £6112, an outstanding debt of £47,710. A portion of this outstanding debt is represented by machinery still in the hands of the government. The minister of mines optimistically remarks: "Add to this the value of the metals won, and the state in general will probably have benefited beyond the money value of the debit balance." However that may be, the fact remains that the transactions of the "grubstaker" are not, as a rule, profitable.

Metallurgy of Cripple Creek Ores

While the Cripple Creek district is justly noted for the large amount of gold it has produced, especially in its earlier years, it deserves lasting honor as being the scene of important metallurgical achievements.

From the earliest days of the district it has been the practice to sort the ore, shipping the high-grade to mills or smelteries out of the district and sending the waste to the dumps. At present the lower limit of shipping ore is about $10. Thus far it was clear sailing—but what was to be done with the ore running less than $5, which was fast building up the dumps to stupendous proportions? The ore was of a highly refractory nature for the gold and silver were tenaciously held in a sulphotelluride combination that made treatment by direct cyaniding inefficient. The ore could be made amenable to cyanidation by roasting, but the high cost of fuel made this procedure prohibitive for much of the lower-grade ore.

The first answer to the perplexing question was advanced by Philip Argall, who, after much experimentation, evolved a scheme by which he proposed to make the million-ton dump of Stratton's Independence give up its treasure. His plan, which is the system now used at the mill, provided for crushing and grinding the ore, passing it over concentrating tables, cyaniding the tailings and, toward the end of the process, adding bromocyanide as a further solvent. By this method the bulk of the refractory minerals and a fair proportion of the precious metals were obtained as concentrates to be shipped to the smeltery at Pueblo, or one of the mills at Colorado City. The record of Stratton's Independence mill for the last fiscal year shows that the ore averaged a little over $3 per ton and a 7(per cent. extraction was made.

A little over a year ago the Portland company started a mill for treating its low-grade ores, likewise employing a combination concentrating and cyaniding method, but substituting for bromocyanide a secret chemical.

We now have to record the starting of the Ajax mill on still more revolutionary lines, for, by the Moore-Clancy process, which is to be employed, it is proposed to slime the ore, and, without preliminary roasting or concentration, subject it to a

combined chemical-electrical process, thereby obtaining the gold and silver in solution. If this process produces the results on a commercial scale that its sponsors claim to have obtained in the laboratory, it may well be hailed as an achievement.

The first two mills mentioned are now acknowledged successes, having demonstrated that "the waste of yesterday is the ore of today." In the early days of each, however, there were not wanting the usual number of "doubting Thomases" ready to predict failure and to pronounce judgment before the mills were fairly adjusted.

The Report on Braden

The Braden Copper Company has this week published a full report on its property and operations by Pope Yeatman, its consulting engineer. We do not intend here to comment upon the substance of this report, but merely to express our gratification that such a report has been published, and our wish that all mining companies in which the public is invited to participate, would do likewise. We are often treated to excerpts from reports whereof the full text is preserved in the private archives of the company's office, and know, of course, that they pertain to those things that the management wants us to believe. But what we want is the whole thing, beginning with "Dear Sir," and ending with "Yours respectfully, ———, engineer," thus conferring upon us the ability to form our own deductions.

If the name of the engineer be a good one his statements of fact will generally be accepted without question, and his expressions of opinion will be received with a great deal of respect. There are some concerns about which there is more or less controversy at the present time that would cease to be controversial, we are sure, if a first-class and universally respected engineering report upon them should be published in full.

The investing public is rapidly learning the value of good engineering and wants to know what the engineer says, not what the promoter says. The possession of the services of an honored engineer is becoming, therefore, the most valuable asset of the promoter. There are many of the latter who have been phenomenally successful and who figure among our leading citizens, but whose following among the public would dwindle to a corporal's guard if they should lose the engineers identified with them.

This puts an enormous responsibility upon the engineer, which is fully recognized, both in the exercise of caution and the maintenance of a probity that is not to be violated.

The California Mineralogist

The appointment of W. H. Storms as State mineralogist of California is a happy solution of a vexatious situation. The reappointment of Mr. Aubury, the present incumbent, seemed to be impossible, and this left the way open to the aspirations of many persons seeking his position and the danger that some incompetent man might be chosen. Fortunately that danger has been averted. Mr. Storms is not only a mining engineer of good repute and real experience, but also is a former member of the staff of the California Mining Bureau and is thoroughly imbued with its spirit and traditions in former times when it was a more useful institution than it has been lately. Consequently there is reason to believe that he will at least try to rejuvenate and make of it the enterprising agent in the promotion of the mining industry of California that it used to be.

Govermental Ore Testing Plants

A correspondent in Utah telegraphed us a few days ago as follows:

"There is a movement on foot here to petition Congress, through our State representatives in Washington, to establish a Government ore-testing and metallurgical laboratory at Salt Lake City. Please let us know whether such a movement will have the indorsement of the JOURNAL and whether it would consider such an establishment to be an unfair encroachment on the functions of assayers, metallurgical engineers and public ore-testing plants. The movement appears to be backed by the American Mining Congress, but if successful would probably become political. Does the JOURNAL consider that such an establishment would be practicable?"

We replied to our correspondent, and repeat here, as follows:

"We are opposed to governmental encroachment upon private business. It is improper for a government to enter into competition with its citizens. A governmental laboratory for ore testing in rivalry with private enterprises would be unfair. We do not consider the project practicable and do not think Congress will further it."

We think that we have stated our views with such clearness that no elaboration of the subject is required. We shall add only that governmental competition with its citizens in business would destroy individualism very quickly indeed, and would be outrageously unfair during the process of destruction.

Camp Bird, Ltd.

From reports received we judge that the recent meeting of shareholders of the Camp Bird, Ltd., held in London was something of a love feast, whereas a person in possession of the single fact that the Camp Bird mine is rapidly dying of exhaustion might have expected a funeral. There were several good reasons, however, for rejoicing, not the least of which was the fact that the veteran mine, in an apparently last supreme effort, presented a profit of over one million dollars for the year's operations; and developments since May 1, 1911, seem to indicate that at least $700,000 additional may be expected before the obituary is written.

The policy of the company in keeping an ample reserve fund proved fortunate, for when the Camp Bird mine showed signs of weakening, the company was able to purchase the Santa Gertrudis mine in Mexico, so opportunely offered. This acquisition is surpassing the expectations of the most sanguine; the ore reserves at the time of purchase, 462,000 tons, having been increased during the 18 months of large-scale development to 1,150,000 tons of positive and probable ore valued at $8,000,000. The new mill, strictly modern in its equipment and arrangement, already gives evidence of efficiency, with an extraction of 93 per cent. The capacity is at present 600 tons daily. That the directors and shareholders are fully alive to the importance of the local staff in bringing success to their undertakings is evidenced in that they have not been niggardly in their praise, and have accomplished their "well done" by a substantial bonus. Such an investment is like "bread upon the waters."

Correspondence and Discussion

Misleading Accounting

In the course of some recent examinations I have observed methods used in accounting which misled the officers of the companies interested, and apparently concealed from them the true condition of their affairs.

In one instance it was claimed that smelting certain ore in the blast furnace could be done for a certain price—let us say $1.75 per ton. The question of the cost of operation was an important one, as large financing depended on it. An investigation showed that in arriving at the cost per ton, everything going into the furnace, ore, slag, limestone, coke, etc., were added together, and the total divided into the total operating cost, and the result was given as the cost of smelting per ton.

I pointed out that this result might give the cost of treating a ton of charge, but that this cost was immaterial. The cost required was the cost of smelting one ton of actual ore, and only the ore entering into the furnace must be considered and the cost determined on that. As a result it was found that the actual cost per ton of ore was almost double the cost first named.

In another instance it was claimed that the cost of putting the copper in the ore into the form of bullion was, say $4 per ton. In this case I found that in the converting department ore was being used for lining the converter shells, which came from the company's own mine. The mine was charged, say $14 per ton for the treatment of this ore, which was considerably more than its gross value. The mining department suffered a heavy loss on every ton of ore it supplied for use in the converting department. In the latter department credit was taken for the profit made in handling this ore, and this profit was deducted from the cost of operating the converters, with the result that it apparently cost nothing to convert low-grade copper matte into bullion. Indeed, in some months actually a small profit was shown, and deducted from the total operating cost of the smelting department. I pointed out that if the mining department was paid a fair price for the ore it would make a profit, while no profit made in treating the ore should be deducted from the operating cost. Figures based on my views showed that the actual cost of smelting the ore in the blast or reverberatory furnace, and converting the matte into bullion was nearly 25 per cent. greater than had been represented to the directors of the company as the cost of treating ore.

Views, Suggestions and Experiences of Readers

It certainly must be bad policy for the officers of a company to adopt methods for figuring their costs, which deceive themselves and also deceive their directors.

A. H. WETHEY.

New York, Nov. 27, 1911.

Retorting Cyanide Precipitates

In an article on the metallurgical practice at the Tonopah-Belmont cyanide plant, in the JOURNAL of July 15, 1911, Claude T. Rice describes the use of the Faber du Faur tilting furnace in refining the precipitates from the zinc boxes, stating that the bullion obtained is 900 to 950 fine in silver and 9 to 12 fine in gold. As this treatment of the precipitates would seem to be preferable to the common practice in Mexico, where no steps are taken to eliminate zinc in any way from the silver precipitate, more detailed description of the Tonopah-Belmont practice would be interesting.

The use of the Faber du Faur furnace to eliminate zinc appears to have advantages over acid treatment. Certainly the operation would be simpler and less dangerous.

Such furnaces were installed at the Goldfield Consolidated when the mill was built, but, I believe, are no longer used, and, so far as I know, nothing has been published about their operation. I recall having read from time to time that they were to be used in other mills that were under construction, but I do not think any of them are now in operation treating gold precipitates.

Julian and Smart mention the objection of decrepitation of the balls of precipitate in the retort when first firing up, and state that particles are hurled over into the condenser; the remedy tried, but not always found effectual, was to use sugar or molasses as a binder for the balls. It is further stated that gold is appreciably volatile in an atmosphere of zinc and thus there is a loss in some of the metal being carried over into the condenser. It would seem that this would not be a real loss, for the condensed zinc would be again used in the zinc boxes, and so a small amount of gold would only be temporarily locked up, not lost.

There must be some good reason why Faber du Faur furnaces have not met with favor in refining gold precipitates, and I am sure it would be interesting if those who have the data would describe the shortcomings of a method that at least looks good.

INQUIRER.

Los Angeles, Cal., Nov. 18, 1911.

Discovery of Camp Bird Mine

In *The Mining Magazine* for October, 1911, there is an editorial on the discovery of the Camp Bird gold mine, in which the statements are wholly incorrect, and the inferences as to my character and ability, unkind and uncalled for. Around the discovery of this remarkable gold mine have been woven all sorts of romantic stories, and much that was nonsensical and untrue. The only correct narrative of the discovery of the mine, and 18 years later of the rich ore in it, was printed in the JOURNAL of June 18, 1910.

In 1877 after receiving my assayer's certificate from Doctor Percy in the Royal School of Mines, I went direct to the mountains of Colorado, and the first two stakes I set were at 11,500 ft. elevation, on the outcrop of a vein, and I named one claim the "Gertrude" after my sister-in-law, Mrs. A. Johnstone Campbell, of London, the other "Una," after my niece, Una Weston, of Brighton, England. The Una I afterward conveyed to Hubbard and Caleb Reed, mining engineers, in consideration of their driving a 150-ft. crosscut to intersect the vein 150 ft. below its outcrop. H. W. Reed ultimately sold to Walsh, and three-fourths of the entire production of the Camp Bird came out of this claim. My partner and I worked our group single-handed for three years, and then sold to Orrin Skinner, of Quincy, Ill., who organized the Allied Mines Company and made me mine manager. The price we received was $50,000 cash, and not a share of stock did we take.

The article in *The Mining Magazine* says: "Mr. William Weston was manager for the Allied Mines, a wildcat enterprise on which Dr. R. W. Raymond reported adversely in 1878." Our sale was not consummated until February, 1880, so Doctor Raymond did not report on the property in 1878. If Doctor Raymond reported adversely, the subsequent production of some $22,000,000 by the Gertrude and Una (rechristened the Camp Bird by Walsh) shows how the greatest of engineers may err in their judgment of prospective mining properties. Furthermore, the Allied Mines

was not a wildcat, for no stock was offered on the open market. It was simply grossly mismanaged at the financial end by Orrin Skinner, the president, who insisted, against my advice and remonstrances, in ordering a big mill, long before we had any ore reserves blocked out to supply it, and thus squandered the money realized by sale of treasury stock, and when money to pay my 50 miners was not put up in advance of the monthly payroll, I promptly resigned. The directors were General Thomas Ewing, Ohio; Hon. Preston Plumb, senator from Kansas; Hon. O. M. Browning, of Quncy, Ill., and former Secretary of the Interior under President Lincoln; B. F. Ham, of Ham Brothers, bankers, of New York; Joseph D. Ripley, Harvey M. Munsell and Major Thomas F. Wentworth, all of New York city. They were also the largest stockholders with H. W. Blair and Hon. A. W. Cragin, of New Hampshire, C. N. Vilas, of New York, Luther M. Merrill, of Boston, and other gentlemen of equally high standing and national reputation, who would certainly not be connected directly or indirectly with a disreputable mining company, and I think this effectually disposes of the inference that I was connected as manager with a wildcat enterprise.

About two or three years after the Allied Mines ceased operations, the property was taken by the Cosmopolitan Mines Company, John H. Maugham, of New York, president and general manager. J. M. Jardine, of Thatcher's Bank of Ouray, acting for the above company, attended to the assessment work each year for some two or three years, and late in the fall of the last year that company owned it, he sent some men to do the work on the Gertrude, which was not then patented. Up to this point there was no ore in the drift on the vein, but the breast of the last 10 ft. driven by these men disclosed a knife blade of rich gold ore, and it was some of this found on the dump when sampled by A. W. Richardson in the employ of Thomas F. Walsh, 16 years later, that gave the latter the clue to the existence of the narrow streak which afterward developed into a bonanza. No samples were taken by the men who did the assessment work as a big storm came on and four feet of snow had fallen, and they had to leave hurriedly for the valley.

The author of the editorial then goes on to say that a piece of ore similar to the Camp Bird bonanza ore was found on a shelf of the dismantled assay office of the Allied Mines, and that I had probably neglected my duty as a good assayer by failing to part my buttons for gold, and so "missed the opportunity of a lifetime." As a matter of fact, as manager of the company I did no assaying—my superintendent was the assayer, and as 18 years had elapsed between the time when Walsh had bought the Gertrude on tax title, and the finding of this sample in a dismantled office, and moreover as already shown, there was no ore in the Gertrude drift during the lifetime of the Allied Mines, the "similar-ore" story and the "failure-to-part-the-buttons" assumption, will hardly hold water. If my story needs corroboration, David R. Reed, civil and mining engineer, now of Denver, who has been connected with the Camp Bird company, and practised his profession in Ouray for 25 years, and a brother of Hubbard and Caleb Reed, owners of the Una, will vouch for the truth of it in all essential particulars.

The man who sells for a big price in cash a colt that years after becomes a Derby winner, and who then regrets he sold it, has a mean streak in his composition. He ought to be glad that the other fellow made a good thing out of it, so, as to the "bitter irony of fate" which the author of the editorial writes about, I fail to see it in that light—to two poor fellows living in a cabin at timberline, working with their own hands, and possessed of nothing but bacon and flour, and overalls, muscle and hope—$50,000 in cash looked as big as a house, and no thought of anything but gratitude to Providence for giving me that start in life has ever entered my mind, and if indirectly I have been the means of adding about $22,000,000 to the world's supply of gold, and resulting happiness to my fellow creatures who were the recipients, I have much to be thankful for and proud of, and nothing to regret.

W. WESTON.

Denver, Colo., Nov. 23, 1911.

Allaying Dust in Mines

In recent years considerable attention has been paid to allaying the dust caused by machine drills while drilling "uppers" or back holes. The wide adoption of the air-hammer drill is largely responsible for this, because that type of machine is designed for drilling uppers or dry holes. When flat or wet holes are to be drilled with air-hammer machines, some form of apparatus for flushing out the rock cuttings must be used.

The increased use of air-hammer drills has, therefore, been attended by an increase in the proportion of uppers drilled in breaking ground. The effect of this is noticeable in many mines, especially the dry mines, by the increase in the amount of dust made. In some mines the difference is so great that the most casual observer can distinguish stopes in which air-hammer drills are being used from those where piston drills only are drilling.

The economy of the air-hammer drill for certain work has become evident. In South African mines air-hammer drills are not so extensively used as in the United States, but even in stopes and drifts where piston drills only are used, many uppers must be drilled, and the atmosphere becomes heavily laden with dust. The government is now attempting to compel the mine operators to protect the miners by prohibiting the drilling of holes that will burden the atmosphere with dust; consequently some device is in demand that will prevent the dust from polluting the atmosphere.

With piston drills the problem is easier to solve than with air-hammer drills. Many devices have been tried and suggested for both types of drills in South Africa, Australia, the United States and other countries. Some of these are designed to catch the dust in a bag or other receptacle, as it comes from the hole, to prevent its polluting the air. Other devices aim to project a stream of water into the hole, so that the cuttings run to the collar as a stream of sludge. Devices of both types have been frequently described in the JOURNAL, all of which have been quite effective, although bothersome to set up and manipulate.

A simple but effective device is used at the Nourse mines, in the Transvaal, which seems to be the simplest so far described. A water pipe is laid in the drift or in the stope up to a point as near the face as possible without endangering the pipe by blasting. A 1-in. or larger pipe is used. To suitable connections on this water pipe ½- or ¾-in. wire-protected hose is laid up to the face. The water in the pipes should be under a pressure of 40 to 80 lb. per sq.in. A jet of water is projected upon the bit, as soon as drilling is begun. When the starter bit has cut to a depth of two or three inches, the end of the hose is flattened and inserted into the hole; as the hole is cut deeper the hose is forced farther into the hole until about two feet of it is in by the time a five- or six-foot hole is finished.

This device requires a boy for its manipulation, which would be a serious drawback to its use in most mines in the United States. It is said that the cuttings flow steadily from the hole and that there is little or no splashing of mud upon the operator or his attendant. It is also claimed that the cooling of the bit keeps its edge in better condition, that it holds its temper longer and that the time of drilling a hole is noticeably reduced.

The objection to the use of a spray or a constant flush of water is that a large quantity of water must be used, and in drifting some provision must be made for draining this water back to the level sump. This objection does not appear of so much weight when it is considered that the time required for cutting a drainage ditch of small cross-sectional area is really less than the aggregate required in setting up and attending to some of the other devices.

T. M. S.

New York, Nov. 25, 1911.

Change in Live Oak Control

An announcemnt to the stockholders by H. B. Hovland, president of the Live Oak Development Company, states that negotiations have been concluded with John D. Ryan and Hayden, Stone & Co., whereby there has been transferred to Mr. Ryan an option on 23,050 shares of the company's stock at a price of $30 per share, this amount to be paid in stipulated instalments so that the entire amount will be paid on or before 90 days from Nov. 23. In addition Mr. Ryan also agrees to purchase from individual stockholders as much of their holdings as they may care to sell, at the same price, provided that their stock shall be deposited in certain designated places on or before Dec. 7, 1911. Prior to the closing of this transaction an offer of purchase made by the Miami Copper Company was refused by the directors of the Live Oak company as not being sufficiently favorable to the latter. Churn drilling continues at the property with four drills in operation. The cutting of the station in No. 2 shaft at the 800-ft. level has been completed and drifting on the orebody will be started. Drifting is also being done from No. 1 shaft, on the fourth level. This drift is in the orebody.

Appropriations for the Geological Survey

WASHINGTON CORRESPONDENCE

The director of the U. S. Geological Survey has prepared estimates for the work of his bureau for the coming year, aggregating $1,690,520 as against $1,305,552 for the current fiscal year. This represents an increase of $385,000. The latter sum is divided as follows: An increase of $150,000 for geological surveys and a like amount for increased work on water resources; an increase of $50,000 for topographical surveys and of $25,000 for mineral resources; an increase of $10,000 for the study of chemical and physical resources.

The two increases of $150,000 each are both on account of the heavier demands of the work of land classification. The growth of the topographic expense is simply due to the fact that the present appropriation does not suffice to comply with the requests that are brought to the attention of the Survey. The increase for mineral resources is intended to permit an expansion and larger edition of the annual volume on that subject. This is the first advance that has been asked for since 1905, notwithstanding that since that date the mineral products enumerated have increased about 50 per cent. The increase of $10,000 on chemical and physical resources would be used in the same way that the increase of $20,000 granted last year was used, for the finding of potash deposits.

The Survey, while it has not found any potash thus far, expects shortly to publish one or two bulletins giving the facts regarding its work on potash. These will show exactly what has been done and where potash cannot be found, as it is thought quite as important to indicate the directions in which a given kind of effort is useless as to point out those in which results can be obtained. The Survey will be able to show where potash can be found in conjunction with other minerals, although it will be noted that no commercial process for separating it is available. Some interesting results of the investigation during the last year are promised.

New State Mineralogist of California

The appointment of William H. Storms as State mineralogist of California, to succeed Lewis E. Aubury, was made by Governor Johnson on Nov. 25. The governor had previously announced that the appointment should be made entirely on the merits as a geologist and mineralogist of a man also possessing business skill and some qualifications as an editor. Mr. Storms has been mine manager, editor and author, and was field geologist for the State Mining Bureau during its early life.

His sponsors for the present appointment were Fred W. Bradley, John H. McKenzie, Mark L. Requa, C. W. Merrill, Albert Burch, Ralph Arnold and Curtis H. Lindley.

Briefly stated, Mr. Storms' experience includes labor as a practical miner and mining engineer in the Black Hills and California, an editor of the *Mining and Scientific Press*, assistant State mineralogist, and field assistant for several years in the preparation of the annual reports and sundry bulletins. He was also the author of "Timbering and Mining," in addition to having contributed extensively to contemporaneous technical literature.

Diamonds in Congo Free State

A shipment of uncut diamonds, numbering about 240, has been received at the New York Custom House and will soon be delivered to Thomas F. Ryan. This shipment is the first tangible result of the expenditure of much time and money in exploring the concession that Mr. Ryan and others obtained about five years ago from the Congo Free State. The concession, held by the Société Internationale Forestière et Minière du Congo, is of large area, totaling about 166,000 square miles, and was believed to be chiefly important for metals and rubber. The possibility of diamonds existed but great importance was not attached to this. The actual finding of these stones as evidenced by this shipment is regarded as an important discovery.

Some Sane Remarks on Conservation

The New York *Times* makes the following eminently sane remarks on the subject of conservation, which deserve the careful consideration of theorists and visionaries.

"Whatever may be thought and said about the Rockefeller loan, and its result, there is one aspect of the matter which teaches a little lesson of its own, useful because of its bearing upon the subject of conservation. Without the help of Mr. Rockefeller or some other capitalist, the ore beds would not have been developed. The Merritts had not money enough to carry out the work. In control of these iron ores they would have been pioneers in the great work of conservation, as that word has come to be understood in our time. In Alaska conservation means keeping the coal in the ground for fear somebody will make money by mining it. If they had been unable to interest Mr. Rockefeller or some other capitalist in their iron-ore properties, the Merritts would have been conservers of that type. The deposits of iron ore would have remained undeveloped. Secretary Fisher, who knows something about Alaska, said to the National Waterways Commission on Thursday, speaking of water-power rights: 'The net public loss through the nonuse of these natural resources is quite as great as the loss through their misuse.'

"The loss to the people of Alaska through the nonuse of the coal under the soil of that Territory has been enormous. They have suffered privation, they have paid enormous prices for coal brought in from British Columbia and elsewhere, and the development of the resources of the Territory has been hindered."

"This is conservation with a vengeance. In the judgment of political conservationists it is better that the people of Alaska should freeze to death than that a profit should be made on private capital invested in coal mining. The cruel and unnatural behavior of Mr. Rockefeller in advancing money to the Merritts for railroad and other development in connection with their iron-ore beds suspended the application of this conservation policy in the Mesabi district."

Residents of Swastika and Larder Lake are raising money for the purpose of building a road, to connect the two camps, upon which work is to be started soon. Swastika seems to be assured of at least two mines, and it has many promising prospects, while Larder Lake has lately been coming in for a good deal of attention on account of some interesting developments there. The new road will serve to open up both camps to a greater extent.

Details of Practical Mining

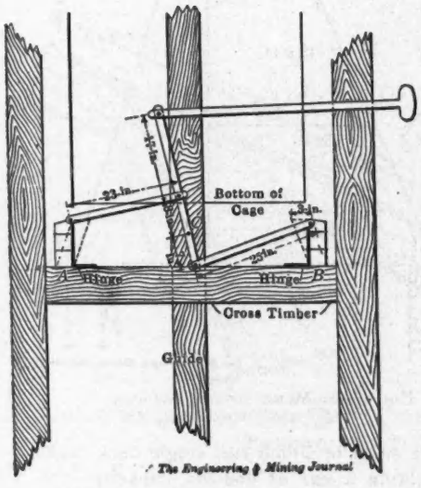
This department is designed to treat in a brief way of details of everyday practice. Many readers are doing interesting things in mining and milling that other readers like to know about. The thought that there is nothing new in them should not be a deterrent to telling about them. Something that is an old story in one district may be quite unknown in another. Our draftsmen can develop any kind of a pencil sketch that is intelligible. A blueprint answers all the purposes of the engraver. Contributions are solicited.

Notes of Interest to Prospectors and Operators of Small as well as Large Mines Things that have to be done in Everyday Mining

Cage Landing Chairs

BY W. F. BOERICKE*

Where cages are not equipped with a self-dumping device, a support is necessary at the top landing for holding the cage while the lander pushes off the car, dumps it and returns it to the cage. In the accompanying drawing, a simple cage chair is shown, together with the "fingers" used for throwing the chair into position.



LANDING CHAIRS IN SHAFT

The cage is of the single-deck counterbalanced type, and works in a compartment 4x4 ft. in the clear. It is, of course, necessary that the supports *A* and *B* of the chair should be out of the way as the cage goes up and down, and there is, therefore, an inch clearance on either side. The supports are of 3x10-in. timber, shod with flat iron, and reinforced by bands of steel going completely around. The tops are sloped as indicated, to give a flat surface for the cage when at rest. The supports are securely hinged to the cross timber, and work with little friction. The fingers are made of 2-in. flat iron, and at the point *C* the device is bolted to the guide. The chair should be of such hight that the car will be exactly level with the tracks on the landing, and roll off without trouble.

An experienced lander and hoist man can operate this device with scarcely a second's loss of time in the hoisting. The cage is hoisted a few inches above the chair, the hoist man knowing by experience just how far to raise it. The chair is thrown in the instant the cage passes, and almost before the cage settles on the supports the lander has started to shove the car off. When the car has been dumped and returned to the cage, the signal is given, the cage lifted a few inches, the chair swung out, and the engine immediately reversed, without further signal or delay. The whole operation, including the dumping, from the moment the car arrives at the landing, until it has started down, can be done in nine seconds.

*Mining engineer, Mineral Point, Wis.

Test of a Blast Furnace Gas Engine

A test run of 1¼ hours was recently made on a twin-tandem Snow gas engine running on blast-furnace gas at the Youngstown works of the Carnegie Steel Company, with the results stated in the accompanying table. The cylinders are 42 in. bore and the stroke is 60 in. The speed of engine was 83⅓ r.p.m.; the piston speed, therefore, was 833 ft. per minute.

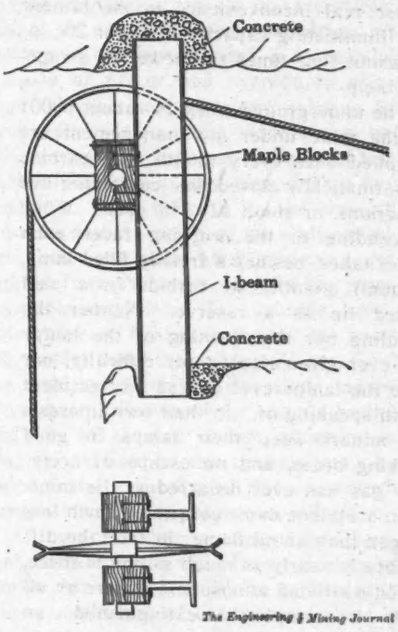
SUMMARY OF TEST RESULTS

Full load rating, kilowatts	2,200
Average load, kilowatts	2,190
Average load, brake horsepower	3,090
Cubic feet of gas per hour	291,080
B.t.u. per cubic foot of gas	86.62
B.t.u. per hour in the gas	25,213,350
B.t.u. per kilowatt-hour	11,513
B.t.u. per brake horsepower-hour	8,160
Efficiency of generator	95%
Brake thermal efficiency	31.2%
Over-all thermal efficiency in power delivered at switchboard	29.6%

Sheave Supports for Underground Hoists

At the Red Jacket shaft, it is necessary to work the lower part of the Calumet & Hecla Company's ground by means of a blind shaft or winze that starts from the 5700-ft. level of the Calumet No. 2 shaft. There an electric hoist is installed which is controlled by the Ward Leonard system of wiring.

The ground around the station has a tendency to move and so it is necessary to mount the sheaves so that the settling of the ground will not cause trouble. This is done as shown in the accompanying sketch. Two I-beams are put together as posts and anchored in hitches so that they will stand the strain coming upon them. To these posts are bolted maple blocks, long enough to extend beyond the steel posts and take the side thrust of the sheave. The sheave shaft with the sheave wheel loosely mounted on it is then bolted tightly in its seat in the maple blocks; maple blocks are also used as cap pieces.



SHEAVE SUPPORT IN SHIFTING GROUND

In this way of supporting a sheave there is only one babbitted bearing to maintain, while the main feature is that, in case either post should move relatively to the other, the wooden blocks will adjust themselves to the change and any serious trouble be promptly remedied. In case the movement is great, new blocks can be put in cheaply and the shaft lined up again, while if two

babbitted bearings are used in this ground that has a tendency to settle and move, endless trouble arises.

Acetylene Lamps in Underground Work*

By Julius Deszenyi†

Besides giving greater illumination, acetylene lamps burn practically without generating soot, and are much less harmful to the miners' respiratory organs than the constantly smoking rape-oil lamp. Ventilation is also facilitated, owing to the acetylene lamp consuming less oxygen than any other. Acetylene illumination is also considerably cheaper than oil lighting.

An acetylene lamp taking a full charge of 250 grams of granulated carbide, will burn, if properly handled, for a period of from 10 to 12 hours. The water filling required, in addition to the carbide, weighs about 350 grams, and when completely filled the whole lamp weighs 1650 grams, which is somewhat heavier than an oil lamp, but not sufficiently so as to cause real inconvenience to the miners. Its illuminating capacity is about 20c.-p., or about four times the power of a rape-oil lamp.

The underground workers (about 6000) in the mine under my management are supplied once every month with carbide in hermetically closed tins, containing five kilograms, or about 12½ lb. each. When descending to the working faces each miner takes, besides a freshly filled lamp, a small quantity of carbide in a well closed tin as a reserve. Neither the handling nor the cleaning of the lamps has ever given rise to any difficulty, nor have the lamps ever caused any accident worth speaking of. In their own interests the miners keep their lamps in good working order, and no escape of acetylene gas has ever occurred at the mine.

An acetylene flame consumes much less oxygen than an oil flame; in fact, the difference is nearly as much as one to three, and in a vitiated atmosphere, where an oil flame is completely extinguished, an acetylene lamp may continue to burn, though, of course, with reduced illuminating power; and, in foul air with a soot-generating flame. This quality of acetylene has sometimes been characterized as a drawback, and indeed not without some appearance of reason, seeing that at times it has actually induced underground managers somewhat to neglect proper ventilation. It is by no means correct to assert that acetylene lamps do not indicate in due time a vitiated condition of the atmosphere. The experienced eye will recognize at once, by the reduced brightness of the flame, and a slight deposit of soot on the burners, when the air does not posses its normal oxygen.

*Abstract from an article in the *Montan Zeitung.*

†Managing director, Salgo-Targan Coal Mining Company, Ltd., Buda-Pest.

A Hanger for Machine Wrenches

At the Superior mine near Houghton, Mich., a special study is being made of drilling equipments. A squirt gun has been designed for use in washing out up-holes, which has already been described in the Journal of May 20, 1911.

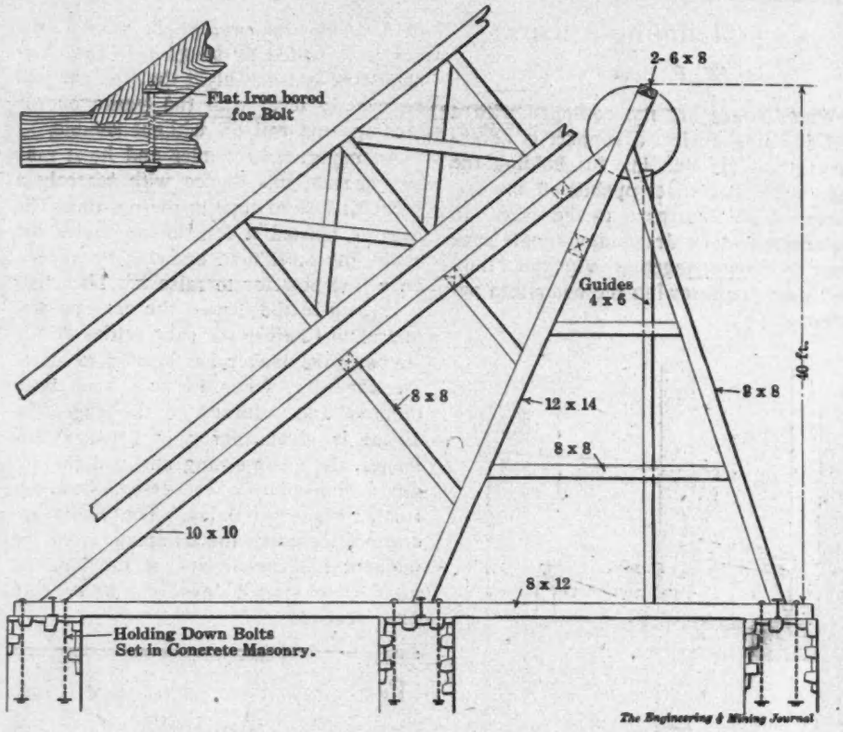
In order that the machine wrench may be in easy reach of the driller, and in order to prevent time being lost in hunting for a mislaid wrench, a strap-iron ring is fastened around the machine-post above the arm. This is made of 1x¼ in. strap iron riveted together with a distance piece between the two ends so as to leave enough space for the handle part of the double-ended wrench to enter. When the wrench is not in use it is hung from this hook. The ends of the hook are curved upward to prevent the wrench from being jarred off. The squirt gun can also be hung thereon when it is not in use.

A later improvement is a hinged and latched post ring so that it can be taken off and put on as desired. There is enough spring in this later type so that it will stay in any position on the post to which it is locked, while the other has to be held in place by a small wedge of wood between the ring and the bar. There is some advantage in being able to take the post ring off, but probably the disadvantage that the detachable ring can be lost is more of a drawback than the benefit coming from ability to detach it. The use of such a ring for holding the machine wrench saves much time and while the miners will at first not favor it, they soon appreciate its convenience.

A Simple Timber Headframe

By W. R. Hodge*

The timber headframe shown in the accompanying illustration was erected and is now in use at the Santa Eduwigis mine of the Benito Juarez Mines Company in the state of Zacatecas, Mexico. It is set on six piers of concrete masonry each 3 ft. square in horizontal section. The 8x12-in. sill is clamped to the piers by ¾-in. holding-down bolts, two to each pier. There are two compartments in the shaft in which run single-deck cages, holding a car of one-ton capacity.



Headframe at Santa Eduwigis Mine

The headframe is so designed that the resultant of the forces incident to hoisting normally falls within the heavy center bent. To the operator in Mexico the chief advantage of this type of headframe lies in the small amount of timber necessary for its construction.

At the Ready Bullion mine at Douglas island, Alaska, chrome-steel stamp shoes and iron dies are used, the latter cast in the Treadwell foundry. During the year 1910 the average wear was one pound of shoes for 2.82 tons and one pound of dies for 4.20 tons of ore crushed, the total cost for iron and steel consumed was $0.0269 per ton of ore crushed.

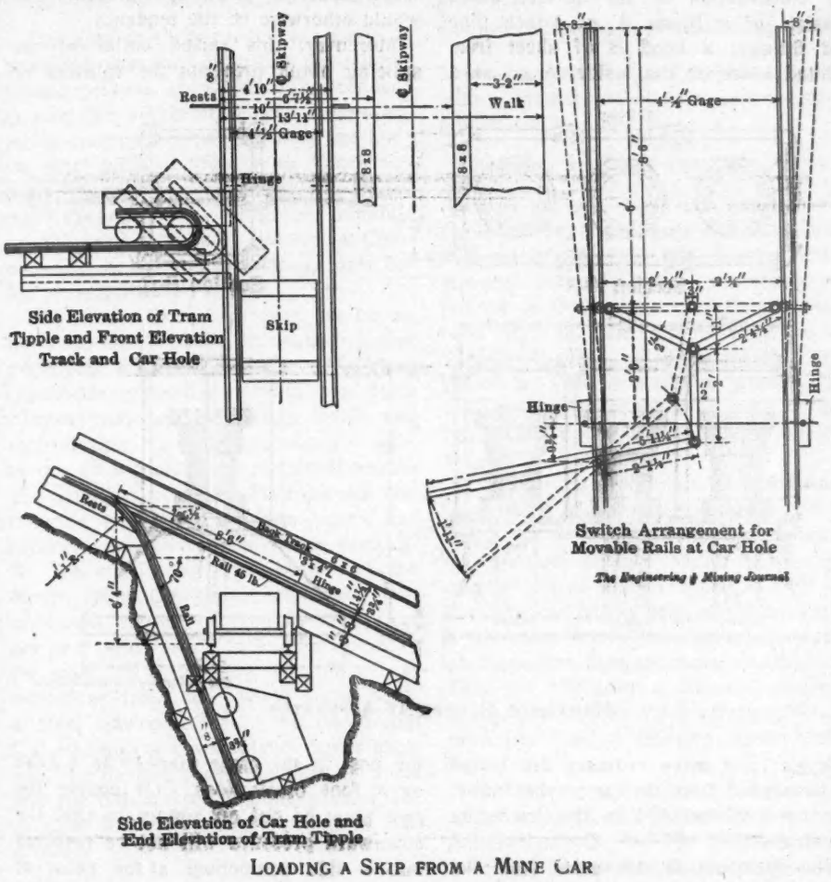
*Mining engineer, 134 College avenue, Houghton, Mich.

Method of Loading Skips

By Guy C. Stoltz*

It frequently happens in mining magnetite in New York State that the course of the foot wall so changes that a shaft or skipway, originally sunk vertically or at a steep angle, must, in order to follow the ore, have a series of vertical curves or knuckles.

The steeply inclined portion of the hoistway requires a skip with high back while the flatter portions require a long-nose skip. To dump tram cars from the different levels driven in the low-dipping parts of the foot wall into the skips when been trammed to the skipway the throw rails are opened by the hand lever and the skip is signaled for the level. The cars are pushed on the tipple and dumped directly into the skip; they are then pulled from the tipple, the skip is hoisted and the throw rails brought back to place. The skip, when lowered, is then free to ride over the throw rails to the lower levels. Usually four cars are loaded at the levels before the rails are opened and the skip signaled. The skips of two tram-car capacity or three tons unload all of the full cars at each level before the throw rails are closed.



Loading a Skip from a Mine Car

the skip stringers are inclined at say 23 deg. from the horizontal and to fill the skip and not spill ore on the hoistway is hardly possible. To overcome this difficulty a small skip pit is sunk opposite each level as shown in the accompanying sketch, the main skip stringers are then broken and carried down the shallow pit at an angle of 70 deg. from the horizontal. This introduces a knuckle just above the skip pit where the sub-stringers tie to the main stringers. The break in the stringers on the main hoistway is about 8½ ft. and the distance is bridged by 5-lb. swinging rails, hinged at the end of the break in the stringers and opened and closed by a system of levers.

When the cars from the levels have

*Mining engineer, Mineville, N. Y.

Fine Grinding at Miami

The problem of the most efficient equipment for fine grinding is still receiving attention at the Miami mill. The first three units of the mill were each equipped with one set of Burch rolls for intermediate grinding, and two Trent chilean mills for fine grinding. The Burch rolls were intended to take a feed containing cubes up to ½-in. in size, and to discharge the material at approximately ⅛ in. in size. The chilean mills were to take the latter feed and grind it to 40 mesh, and have been doing so approximately in practice, 0.029 in. being the exact size.

The fourth section contains one set of Burch rolls, and two 8-ft. Hardinge conical mills. These have been giving fairly satisfactory service, but owing to conditions of feed it has been thought desirable to increase slightly the fine grinding facilities, not only to take care of any inequalities of feed but also to assure a sufficient capacity, should one of the fine grinding units be temporarily out of commission. In consequence the fifth section will contain one Burch intermediate roll and three Evans-Waddell chile mills and the sixth section will contain one Buch intermediate roll and three 8-ft. Hardinge conical mills with bevel gear drive.

These three Evans-Waddell mills will have rollers much heavier than those in the Trent mills. The results obtained in these last two units will be awaited as an interesting comparison of the work of these two types of fine-grinding machinery.

Use of Cyanacides in Washing Slime Samples

The lowest possible residue value in slime treatment by cyanide solution can only be obtained when all the accessible gold is in solution before decanting or filtering is commenced, and it is merely a waste of power and cyanide to continue the treatment after the solution is complete. It is essential, therefore, to be able to obtain an accurate estimate of the undissolved gold at any time during the treatment. The difficulty in the way of accurate determination of the undissolved gold has been that, after removing the sample from the mass of pulp the more favorable conditions for cyanide reaction cause a further solution of gold. Obviously, then, the assay will not show the true condition of the slime under treatment. Dilution of the sample by the addition of a large excess of water to stop the action of the cyanide may be only partially successful due to surface concentration and adsorption effects.

At the September meeting of the Chemical, Metallurgical and Mining Society of South Africa, H. A. White presented a paper on the use of certain cyanicides in the estimation of undissolved gold in slime pulp.

While investigating means to destroy cyanide in the tailing used for "sand filling" in the mine, Mr. White found that the addition of an excess of alkaline permanganate to 0.10 per cent. KCN at once and completely destroys its power to dissolve gold leaf. Bleaching powder in alkaline solution also possesses both these properties.

This knowledge was used in the following method for examining the course of treatment of slime by cyanide solutions: A bucket is half filled with gold-free water to which has been added a sufficient excess of a saturated potassium-permanganate solution to leave a decided pink color after the addition of the slime sample. At a definite time

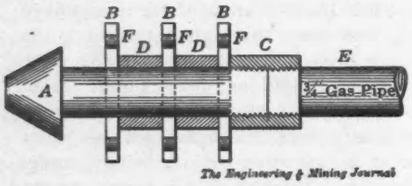
during the treatment the sample of pulp to be tested is taken by means of a tube with a flap valve at the bottom, or by other suitable means, and allowed to run into the prepared bucket under the surface of the solution and with as little exposure to the air as possible.

The bucket is then filled with water, allowed to settle and the solution poured off and discarded. The operation of filling with water, mixing thoroughly and allowing to settle is repeated four times, in each case with the addition of lime water to hasten settlement. Finally the sample is dried for assay. In performing the assay it is especially necessary in certain cases to secure a large button of lead. "Washing" with litharge and reducer should not be neglected, and fusion should be completed at a high temperature.

Cleaning Clogged Pipes

The device shown in the accompanying sketch is a tool described in *Domestic Engineering* for cleaning pipes which have become clogged by a deposit of mud.

The tool is made of a solid bolt of iron, with a conical-shaped head *A*, the point being moderately sharp for driving with a mallet. Washers *B*, of not more than 2¼ in. diameter, are slipped over the bolt and kept in position by sleeves *D*, cut from gas pipe slightly larger than the shank of the bolt. Not less than four holes should be bored in each washer, as at *F*, to let the water pass and carry out the mud cut loose by the cleaner.



TOOL FOR CLEANING CLOGGED PIPES

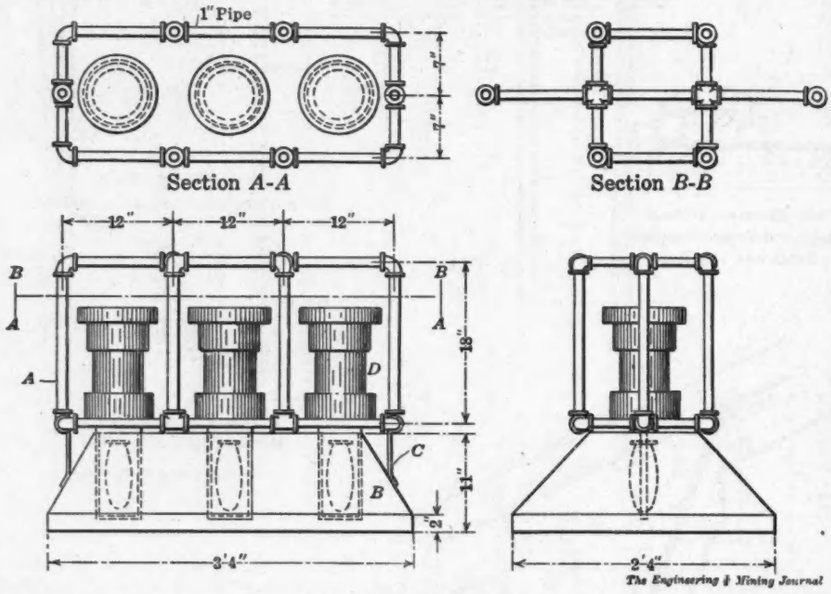
If the joints are properly made the ¾-in. pipe is best, as it does not weigh as much as the 1-in., and two or three men can handle a greater length when cleaning. Bolt *A* should be about 2 in. between head and the coupling. This enables one to hammer the cleaner loose if it should become fastened.

To operate, take the tool and insert at the discharge end of the pipe. First connect one length of pipe, shove and pull until this length gets too short, then add another, and so on. With four men over 300 ft. in a stretch can be cleaned. Then draw out the cleaner, measure along the pipe line to point it reached, dig out two or three lengths, cut the coupling nearest the discharge, raise the pipe gradually until the free end is above the trench, add a length so as to carry the water away from the pit; then start and work the cleaner as at first, and repeat until the entire line is clean. Bear in mind that each time the pipe is cut that the water must be cut off until ready to start the cleaner. Never attempt to use it until the water is flowing.

A Homemade Blueprint Apparatus

A homemade blueprint apparatus for use where the quantity of such work done does not warrant the purchase of one of the more expensive machines, is easy to make and inexpensive, says D. C. Tash, in *American Machinist*, Aug. 10, 1911. The accompanying sketch shows the construction of the device, which consists of a frame *A*, of 1-inch pipe and fittings; a hood *B* of sheet iron, painted white on the inside to act as a reflector; and three ordinary arc lamps *D*, suspended from the top of the frame. The hood is fastened to the frame by the straps *C*.

The apparatus is suspended from the ceiling over a table, and an ordinary sun-printing frame is placed in position under it.



HOMEMADE BLUEPRINT APPARATUS

Spliced Posts in Underground Workings

Often when easing timbers in heavy ground a stull or post is cut out which is still in good condition except at its ends where it has been crushed by contact with the head and foot block; and, were it longer, would be as serviceable as ever.

A number of such posts, about two feet in diameter and five or six feet long are obtained during the process of easing the timbers in the shafts of the conglomerate mines of the Calumet & Hecla company. These are used again in supporting the roof in drifts, where there is not much side swing to the ground, by splicing two of them together.

The method of splicing consists in putting in two short posts, butt to butt, with a 3-in. plank of soft pine or hemlock between to act as a binder. As the pressure comes on, the posts are pressed into the soft plank. This plank is larger than the end section of the posts, and that part of the plank not in contact with the posts instead of being compressed, is spread or burred so that a raised collar or edge forms around the two posts and prevents them from swinging sideways under a downward pressure, as would otherwise be the tendency.

Moreover, this raised collar of the splicing plank prevents the splitting of the post in the same manner as a head or a foot block does. Of course the post must be cut off square so that the downward pressure will not be resolved into a side component at the point of splicing. Longer pieces of timber that have been recovered from worked-out stopes in the conglomerate mines are also utilized at the upper length of a three-post set in much the same way. Of course where there is much side swing to the ground, spliced posts cannot be used.

In surveying in deep, inclined shafts, much difficulty is often encountered in keeping the plumb-bob line from swinging violently, due to drafts, etc. This can be overcome in great part by the use of the following device. Construct a gutter of light wood or sheet metal with sides 4 in. wide; this can be held vertically in such a position as to shield the string without touching it. Under most conditions the plan is effective.

The Ajax Mill, Victor, Colorado

Last week the Ajax mill, at Victor, Colo., started operations. This mill, financed by E. A. Colburn, president of the Ajax Gold Mining Company, was built at the mine to treat the ores of the Ajax company and its lessees. It was concluded that treatment on the ground would be a profitable venture, because it not only would eliminate many handlings, but would make it economically possible to mine ore of a much lower grade.

The Ajax is the first mill to install the Moore-Clancy process. A. W. Warwick estimates that the chemical consumption will be 12c.; the total cost $1.20; and the gold in tailings, less than $1 per ton.

First Use of Moore-Clancy Process

The Ajax or Colburn mill is unique as being the first mill to install the Moore-Clancy process, by which it is proposed to treat the highly refractory sulpho-telluride ores by a direct chemical method; the other mills of the Cripple Creek district depend upon concentration to remove the bulk of the refractory minerals for shipment to mills or smeltery at Colorado City or Pueblo, the tailings only being cyanided in the district.

The Moore-Clancy process, so far as has been made public, consists in using a complex solution composed of calcium cyanamide, potassium cyanide, potassium sulphocyanide and potassium iodide and electrolyzing the mixture, thereby generating among other compounds the halogen cyanide necessary to break up the telluride minerals. After a year's experimentation on Cripple Creek ores, A. W. Warwick, chief metallurgist of the Moore Filter Company, determined that a current density of from 5 to 7 amp. per sq.ft. and from 5 to 7 volts would do the work, 15 to 20 amp. per ton of ore treated or from 105 to 140 watts being all that was necessary. He also found that by keeping the solutions rather alkaline, the desired reactions were obtained and the difficult problem of keeping the solution neutral, originally proposed, was avoided.

Crushing and Cyanide Departments Separate

The mill, designed by S. A. Worcester, of Victor, Colo., has a capacity of 200 tons, but is so arranged as to permit of enlargement to 460 tons daily capacity when conditions warrant it. The only available site for the mill was not ideal and much ingenuity was necessary to provide a building and arrangement adequate for the requirements.

Essentially the mill consists of two parts: The crushing and sampling mill and the chemical-treatment plant proper. The ore is brought to the mill in a 6-ton, third-rail crane-motor car; dumped directly into a 5C Symons crusher and broken to about 1¼ in. From the crusher the ore is elevated and delivered to two conical sheet-iron ore bins. One of these bins is provided with a Fairbanks scale with a capacity of 35 tons, for weighing lessee ore.

Grinding by Rolls and Tube Mills

From the ore bins the material is passed through a magnet and is elevated to a set of Colorado Iron Works impact screens. After screening, the ore is delivered to three sets of Allis-Chalmers rolls 16x36 in. The screens used are ⅝, ¼ and 10 mesh. All the material that passes a ¼-mesh screen is passed over a 27-in. Snyder sampler, a cut of 5 per cent. taken and delivered to the sampling plant.

The finely crushed material is delivered to a 16-in. rubber conveyer belt, 250 ft. long, and is carried up a 20-deg. slope to a vertical elevator which delivers the crushed ore to three cylindrical steel ore bins, situated at the head of the chemical-treatment plant. The combined capacity of these ore bins amounts to 600 tons. Each bin will store a different character of material, and they are arranged so that each will feed a separate screw classifier.

The slime overflow from the classifiers is delivered by air lift immediately to the agitator system, and the oversize, which is diluted to a proper degree of thickness, feeds a Stearns-Rogers spiral-fed trunnion tube mill 16 ft. long and 5 ft. in diameter. There are three tube mills, each with its own closed cycle and each crushing to a different degree of fineness, according to the character of the ore which each tube mill is receiving. The ore is crushed in solution.

Slime Agitated and Electrolyzed

The slime goes to five specially designed agitators, each with a capacity of from 80 to 100 tons of dry slime. The pulp will have a ratio of one ton of ore to 1.5 tons of solution. In the agitators there are 20 electric baskets for the purpose of electrolyzing the solution. Each electrode basket has an anode surface of about 4 sq.ft., and with a capacity of 35 amp. each. The electrodes are carried on heavy steel-rail busbars. The current is furnished by a General Electric 15-kw. generator, arranged to deliver 3000 amp. at 5 volts, or 1500 amp. at 10 volts. By means of field resistances the voltage of the generator can be regulated at anything between 5 and 10 with corresponding amperages. The delivery of the current is regulated to each agitator by means of a Westinghouse switchboard.

The ore, crushed to approximately 150 mesh, is agitated for 24 hours with low-pressure air delivered by the mill compressor, although the air system is connected with the mine compressor giving air at 100 lb. in case of emergencies. After agitation the pulp is delivered directly to the loading tank of the Moore filter plant with a filtering area of about 9500 sq.ft. and a capacity of about 200 tons of dry slime daily.

The Moore filter plant offers some novelty in that the crane is entirely operated by hydraulic power both for lateral and vertical motion. The use of the equalized load furnished by a hydraulic pump compares favorably with electrical cranes both for economy and ease of operation.

The clear gold solution delivered by the filter system is precipitated by zinc dust fed intermittently by a tripping arrangement operated by the flow of gold solution. The precipitated gold is collected by two Stearns-Rogers special filter presses with 24x30-in. plates. Each press contains from 24 to 30 plates.

Aerial Tram to Tailing Dump

The slime delivery from the Moore filter plant will be made by a screw conveyer working in the bottom of the discharge tank. The slime will be conveyed from the mill to a large bucket carried on a cableway and moved by a small electric hoist. On the cableway, trips are provided so that, automatically, the bucket will dump in a different place at every trip. By this arrangement it is hoped that the material will have a chance to spread and dry before another bucketful is dumped upon it. This is of importance to prevent large slides in the slime piles.

Estimated Operating Cost

In the chemical-treatment part of the mill is situated the laboratory from which the metallurgical operations are controlled. It is, of course, too early to give exact figures as to cost, chemical consumption and extraction; but, based on results of several hundred tests, the Moore Filter Company expects that after adjustments are made and the mill has settled down to regular work less than $1 will be left in the tailings, with a chemical consumption of 12c. per ton and

a total operating cost of $1.20 per ton. The plant is in charge of E. A. Coleman, Jr., as local manager; W. A. Kunkle, mill superintendent; J. A. Hitchcock, electrician; W. A. Gilbert, chemist; A. C. McKeehan, master mechanic.

Gold Discovery at Putu, Chile

By Mark R. Lamb*

Word recently came to Santiago[1] that golden boulders had been found at Putú, about 200 miles south of Santiago. A young business man of the town of Constitución came to Santiago with some specimens to find Enrique Stuven, a mining engineer. This young man arrived Sept. 18, during the independence-day celebration. Mr. Stuven was attending the military exercises. When he saw the samples of ore containing 60, 70 and as high as 90 per cent. gold, he straightway forgot the 18th, the military and even independence. Mr. Stuven, accompanied by an attorney, Arturo Alessandri, hastily took the train for Talca, changed to the Constitución branch, and the same afternoon arrived at Putú, after a two-hour canter along the coast.

*Manager in South America for Allis-Chalmers Company, Santiago, Chile.

[1]Eng. and Min. Journ., Sept. 30, 1911.

Gold Discovered in Building Stone

Putú can boast of an accumulation of perhaps 50 mud houses. The town mason was laying a stone foundation for one of these houses, and, desiring more boulders, had sent his cartman to a ranch house a mile out of town, where there was an old foundation. The cartman brought his load to town. One rock was so extraordinarily heavy that he broke it open to see why. This breaking was difficult and required the use of a cold chisel. The cartman was not sure whether the metal revealed was gold or brass, but he buried the pieces, returning for them after hours and dividing with the mason. It is estimated that this boulder contained 500 oz. of pure gold.

The mason, Rodriguez, went to the spot where the first find was made and found more. All the little town went also. The steep little hill was immediately the scene of intense activity. Every man, woman and child was eagerly digging for the gold rocks. Most of them were skeptical as to the finding of more, and some doubted that the metal was gold.

An ounce of the metal sold for four, then five or six dollars, rapidly climbing in six days to $12. At first no one knew how to estimate the quantity of gold in the rock, the only sure way being to break off the rock and weigh the clean gold. Valuable specimens were thus spoiled and are now only worth the weight of the gold.

Question of Ownership of the Land

The usual legal entanglements immediately appeared. The owner of the ground is a poor miner, now in the north of Chile working for day's pay. His wife claims the mine because the law says that placers or lavaderos belong to the owner of the ground. The cartman claims, by right of first discovery, and Rodriguez claims by right of first legal record. Plenty of lawyers are ready to help them all to prove their claims. Meantime, Rodriguez has formed a company, and permitted Stuven and Alessandri and their friends to subscribe a fund for prospecting. The little hill is being thoroughly trenched in an endeavor to find the vein.

When I went there it was said it would be a simple matter to find the vein. It would simply be necessary to start where the rich rock was found, do a little panning and so follow the gold up the hill to the vein. That scheme failed, as there was no gold in the dirt, so the only way was to trench, sink and strip.

The whole country near Talca and Constitución looks attractive to a gold

Transportating Supplies and Crossing Maule River Near Putú

Trenching to Find the Gold Vein on the Hill Near Putú, Chile

miner. The existence of wood, water and food in the vicinity is ideal for the prospector; the climate is exactly that of southern California. Twisted and distorted beds of slate show small stringers of quartz, and float is found in all directions.

If a good vein is found at this place, many searchers will soon be in the field. As it is, numerous prospecting companies have been formed and parties of gold hunters are met along the way continuously.

DISCOVERERS HAVE SIX MONTHS TO SURVEY CLAIMS

The Chilean law gives the discoverer in a new district a period of six months to make the final survey of the three claims he is entitled to stake and during this time others can obtain no legal possession to any immediately adjacent land. This is hard on the eager, of course, but it gives the North American prospector an equal chance with the Chilean.

The accompanying illustrations will give an idea of the surrounding country. As this is being written in Bolivia, the news comes that the vein has been found, but no details as to whether large or small. The actual discovery of a vein will stimulate prospecting wonderfully. If the vein is as wide as the shortest dimension of the big boulders found, it will be a wonder.

WHERE THE GOLDEN BOULDERS WERE FOUND

ADJOINING RANCH HOUSES WITH GOLDEN FOUNDATIONS

Gold and Diamonds in British Guiana

The report of the Institute of Mines and Forests of British Guiana for the year ended June 30, 1911, shows a gold production of 54,064 oz., a decrease of 7509 oz. from the previous year, and the smallest output since 1890. Of the output, dredging furnished about 17 per cent.

The output of diamonds for the year ended June 30, 1911, was 36,540 stones weighing 4683 carats, a decrease from 77,695 stones and 6319 carats for the previous year. The total output for 10 years has been 927,874 stones weighing 66,556 carats.

Michigan Iron Notes

NEGAUNEE CORRESPONDENCE

Important exploration work is being carried on in the Crystal Falls district. The Longyear interests, under the name of the Nevada Land Company, that have been drilling for three years in the vicinity of the old Delphic, Alpha and Mastodon mines about six miles southwest of Crystal Falls, are reported to have found commercial ore on the Mastodon property at the foot of Finnerty hill, on S. 13—T. 42—R. 33. Much of the iron formation in this vicinity has been previously found to be low grade and pockety, but the drilling by the Longyear company was thorough and was conducted under the geological direction of W. J. Mead, of the University of Wisconsin. The nearest operating property is the Dunn mine of Corrigan, McKinney & Co., two miles to the north. Part of the land under option to the Longyear company is held in fee by the Keweenaw Land Association, and by Theodore Davis *et al.*

There is some activity between Crystal Falls and Amasa, about 12 miles northwest; on the Porter lands, on S. 22—T. 44—R. 33, just south of the Gibson mine of the Rogers-Brown company, a drill has been operating since early in the summer and ore has been found. This drill is operated by the Iron Development Company, a private exploration corporation formed recently by Iron River men. The Florence Iron Company is negotiating for holdings in the same district. This is the ore formation on which are situated the Hemlock mine of Pickands, Mather & Co., the Michigan mine of the Oliver Iron Mining Company and the Gibson mine of the Rogers-Brown Ore Company.

The M. A. Hanna company has been quite successful in its drilling on the Carpenter-Cook lands on the southwest quarter of S. 31—T. 43—R. 32, between the Dunn and the Tobin mines of the Corrigan, McKinney company, about three miles southwest of Crystal Falls. In spite of the fact that the deposit merely crosses the corner of the M. A. Hanna holdings, the drills have indicated a large tonnage of good ore.

The Steel Investigation

WASHINGTON CORRESPONDENCE

A temporary check has been given to the activities of the Stanley Steel Investigating Committee. Counsel for the United States Steel Corporation have presented argument to show that the committee has no authority which would warrant it in continuing its investigation since it was originally organized to study those conditions in the steel industry which had not yet been made the subject of Government suit. When this matter was put before the committee last week, difference of opinion broke out. It was urged by one group in the committee that the body had no authority to go ahead, it being the manifest intent of Congress not to permit investigations of subjects that were already being prosecuted, inasmuch as this would tend to give immunity to the persons under attack for any illegal acts they might have committed. The other group in the committee took the view that the prohibition referred only to matters that had not been made the subject of suit at the time when the resolution was adopted, so that it did not operate as a restriction upon the work of the committee at the present time. There were five votes adverse to this view and only four in favor of it, so that it has been necessary to defer action until the opening of Congress, when it will be seen whether that body will enlarge the authority of the committee to the extent that is deemed necessary. This will involve a contest on the floor if the issue is allowed to become acute. It is not believed that those in charge will allow the situation to reach the stage of open controversy, inasmuch as that would involve a revival of the old discussion as to the alleged influence of the Steel Trust over the party leaders—a topic which they are very desirous not to have renewed.

Stratton's Independence, Ltd.

The report of Stratton's Independence, Ltd., for the year ended June 30, 1911, shows that the net profit for the year was £21,000, of which sum £12,500 were paid out as a dividend. Development work to the extent of 9186 ft. was done in the mine, of which 19 per cent. was in the form of crosscutting. According to the consulting engineers, Philip Argall & Sons, by far the greater part of the ore discovered during the year is the result of this persistent crosscutting. On the surface, while the same number of lessees was working, the majority of them worked on a small scale. All surface leases are now limited to 50-ft. depth, and all the ground between that depth and the 100-ft. level is to be worked from the new "A" level.

The "A" level was started in February, 1911, to develop the ground between the 100-ft. level and the surface and at the same time to obtain waste rock to fill the old stopes of the mine. There is still a great quantity of ore in the old workings, which cannot be reached until the stopes are filled and made safe, so that in driving this "A" level through the caved ground it will be possible to drop a quantity of waste into stopes that are particularly dangerous in their present unsupported condition. A raise was put up from the 100-ft. level at a point 150 ft. north of the shaft and ore was found. The level was then started both ways, north and south, on ore in the north end; the ore continued for 125 ft. before barren ground was struck. Superintendent Johnson believes that when the "A" level is completed to the north end line of the property and is thoroughly prospected, it will be one of the best producing levels in the mine, and it will do away with all surface leasing. The drainage tunnel had not relieved the water situation to any great extent, the water having receded only 50 ft. during the year.

In addition to ore of shipping grade the company for the first time produced low-grade milling ore amounting to 7440 tons. The greater part of this was sorted out of the ore rejected by the lessees and sent direct to the mine breaker, while the waste went back into the mine for filling. Formerly both products, the low-grade milling ore and the waste, went to build up the ore-house dump. Now everything that passes through the ore house is worked up daily and finally disposed of. The total production of the mine was 25,825 tons, having a gross value of $534,068 and a value of $389,008, after deducting freight and treatment charges.

The mine breaker and roll mill began operations in October, 1910, and averaged about 825 tons per month during the nine months of the fiscal year in which the plant was in operation.

In addition to the changes required to combine the wet mill with the mine breaker and roll mill, the permanent breaker plant of 70 tons per hour capacity was erected in the clearing made in the heart of the dump by previous milling operations.

The fourth chilean mill was erected as a reserve, and six more slime tables added, together with new distributers and a new settling tank in the cyanide department. These additions brought up the milling capacity from 7500 tons per month to 10,000 per month, an increase of 33 per cent. The sum of £13,900 was charged to mill construction during the year. The 109,800 tons of ore milled during the year averaged 0.157 oz. per ton. The total recovery was 71.5 per cent.; 43.65 per cent. by concentration and 27.85 per cent. by cyaniding. The total milling cost is given as $1.52 per ton, which agrees closely with Philip Argall's estimate made in 1907 as to the probable cost on a basis of 10,000 tons per month with 70 per cent. extraction.

Taxing Cripple Creek Mines

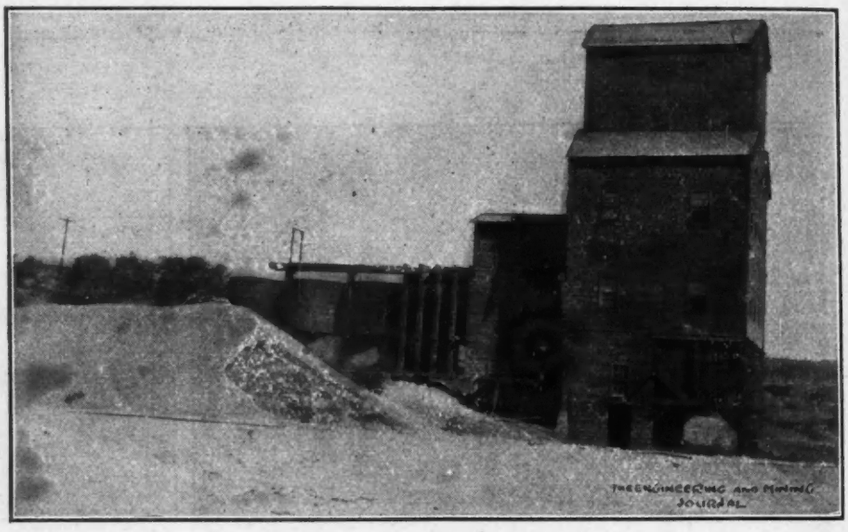
DENVER CORRESPONDENCE

The first step in the battle which mining men have begun, to obtain better laws regarding the taxing of mines, was taken in the district court at Colorado Springs on Nov. 16, when Judge Sheafor issued a temporary injunction restraining the treasurer and commissioners of Teller county from selling for taxes the properties of 11 Cripple Creek companies. The court ruled that the term "gross proceeds" means the amount of money received after deducting freight and treatment charges, while the assessor decided that it meant gross output and taxed it accordingly. If this ruling is not set aside by the Supreme court, the 15 mining companies will save $22,000 for 1910, and being a test case, all other producing properties in the Cripple Creek district will be similarly benefited.

Huff Electrostatic Plant in Mexico

BY F. S. MACGREGOR*

The property of the Calumet & Sonora Mining Company is about two miles from Cananea, Mexico, and includes a large deposit of galena, chalcopyrite, pyrite and zinc blende. The wet concentrator makes high-grade lead concentrate, copper-zinc middlings and tailings. As there had been no way to utilize the middlings, they were piled pending the discovery of a successful method of treatment. At the same time the ore mined was selected so as to make a mill feed containing as much lead as possible with the minimum of zinc.



CALUMET & SONORA 40-TON ELECTROSTATIC PLANT

ELECTROSTATIC PLANT RECENTLY COMPLETED

After investigating various methods, electrostatic separation was found to be the most suitable, and J. N. Houser, the superintendent, proceeded with the erection of such a plant. This was put into operation during the first week of August, 1911, and the work since then has fully equaled the results obtained in the preliminary tests several months previous.

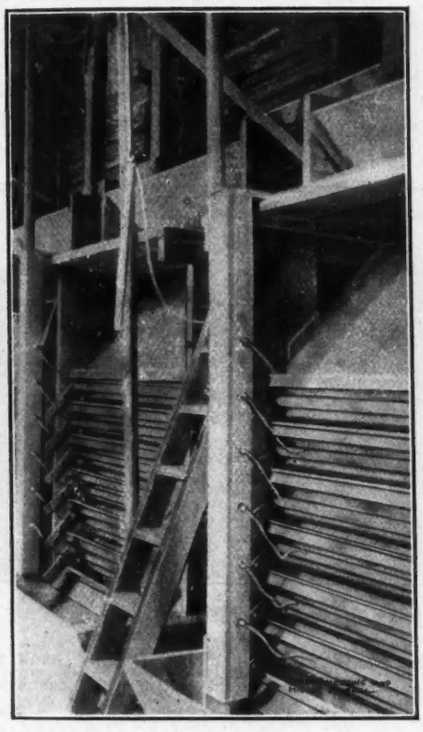
The plant is in a frame building, shown in the accompanying illustration. Above the bins for finished products are two floors for separators, and in a tower are two screens for sizing. The middlings are trammed in mine cars from wet concentrator to the mill, and a platform ele-

*Metallurgist with Huff Electrostatic Separator Company, 60 India street, Boston, Mass.

vator lifts the cars to the level of the feed bin (shown at the left of the mill). Before dumping, the car is weighed and sampled.

Part of the mill feed is taken from the stock pile, the rest comes from the concentrator. As the major part of this stock pile has stood for some time, there has been a solvent action of the copper from the chalcopyrite and other copper minerals and a precipitation of the copper from the solution thus formed on the zinc-blende particles, rendering them good conductors.

As the separation of the zinc from the other sulphides depends on the difference in conductivity, it was necessary to alter this condition. To do this the stock-pile ore is dumped into the tanks beyond the first feed bin and given a bath of weak potassium-cyanide solution. The cyanide is pumped from



HUFF ELECTROSTATIC SEPARATORS AT CALUMET & SONORA MILL

a tank below, and after using is drained through the filter bottom and used for the next tank. This solution dissolves the minute film which is formed on the zinc, and the difference in conductivity is restored.

CONDUCTIVITY DIFFERENCES INTENSIFIED BY COPPER-SULPHATE SOLUTION

In this case natural causes have accomplished what may be done artificially—by giving a zinc product containing barite, rhodonite or other heavy gangue a bath of copper-sulphate solution. After drying, the zinc may be repelled from the heavy gangue, which could not be removed by tabling in the first place.

Under these tanks and bins runs a conveyer belt, and over it a traveling automatic feeder. By this arrangement the mill can be fed either from the stock pile or with fresh middlings. The belt delivers to the drier, which is of the cylindrical type.

From the drier the ore passes to No. 1 elevator, which delivers to an oversize (2 mm.) trommel on the first floor. The oversize passes to a small set of rolls, and the undersize to No. 2 elevator, which delivers to the screens in the tower. Three sizes are there made, 2 mm. to 20 mesh, 20 to 40 mesh and through 40 mesh.

The material above 20 mesh is separated on the Huff roll-type separator. The fine material passes to separators of the Huff toboggan type, which has been used only recently. The American Zinc Ore Separating Company, in its plant at Platteville, Wis., has developed, for the treatment of the fine material, a type which has no revolving parts, except a slow-speed feed roll at the top. As shown in the illustration, it consists of a series of curved surfaces over which the ore slides by gravity. This type is adapted for fine sizes only, the roll type being adapted to the coarser material.

FORMER WASTE IS NOW PROFITABLE

The finished products are termed the "copper" and "zinc" and fall directly to the bins; these are shown at the lower right-hand corner of the mill. From these bins the products may be drawn off into wagons and hauled to the railroad.

A 20-h.p. electric motor drives the plant, power being obtained from the power plant of the Greene-Cananea Copper Company. The separating plant has shipped regularly since starting and has given no trouble. About 40 tons per day are handled, approximately 20 tons being the daily output of the wet mill and the rest from the stock pile. In practice the mill is run on one class of material until the other has accumulated sufficiently to make a several days' run. The stock pile assays: Silver, 3 oz.; zinc, 30; copper, 7; iron, 15, and lead, 3.5 per cent. The present wet-mill middlings assay: Zinc, 40; copper, 5; iron, 10.5, and lead, 1.5 per cent. The zinc product averages 55 per cent. zinc, 5 per cent. iron; and the copper product 9 per cent. zinc, 16 per cent. copper and 10 oz. of silver. Only three men per shift are required—an American shift boss and two Mexicans.

As can be seen, both of these products are of value and can be economically smelted. Heretofore this material has been lost, as there was no market for the two mixed. Not only has this saving been effected, but the problem of mining has been simplified, enabling any stope to be mined whether it furnish lead or zinc, where previously zinc had been avoided.

The Cresson Consolidated Mine, Cripple Creek

DENVER CORRESPONDENCE

For economical management, good results and a clean record, the Cresson Consolidated Gold Mining and Milling Company, of the Cripple Creek district, deserves special mention. It is a close corporation, the stock being held by a few Chicago and Detroit men, and has been a dividend payer for six years. For five years the shipments were 2500 to 3000 tons of medium-grade ore per month, and the mining costs are generally admitted to be the lowest in the district. During the last year rather unusual ore conditions have prevailed at the mine, as on the lowest level the ore increased in value, but with a lower tonnage, 1600 tons per month being the present output, which pays dividends and adds to the surplus.

The mine equipment is simple compared to that of many other mines in the district making an equal tonnage. The shaft has but one hoisting compartment, but uses a counterbalance on the manway side. The counterbalance was designed at the mine, and was the first used in the district. A skip is used instead of cage, with trolley cars to carry ore and waste from the shaft. The compressor is electrically driven. The ore house is arranged with trommel screen and washers, and the ore is sorted on a belt, the waste being taken away on a conveyer belt. The usual ore-sorting belt of rubber has been discarded in this mine, and an iron-slatted belt, designed by the manager and built by Master Mechanic Hatfield, is now used in its stead. This belt increases the efficiency of each sorter, as it removes the fines which are taken to a bin by a conveyer belt. The mine is 1200 ft. deep and on the 1100-ft. level two winzes 200 ft. apart have been sunk to a depth of 90 ft. each, and are both bottomed in good ore, and crosscuts from each winze, to which the 1200 level is being driven, show the width to be as great as in the 1100 level. Richard Roelofs is the manager.

The first steam shovel to be used in Black Hills mining is being erected at the Wasp No. 2, where it will be used for stripping. This installation has been contemplated for a long time and owing to the heavy stripping encountered in parts of the property, has become a necessity. Its successful operation will, according to the officials, pave the way for a second shovel, next year, which will be used in loading ore. In a recent statement in a local paper, it was claimed that at one time cleanups at the Wasp No. 2 averaged 89c. per ton, and that a small profit was made; that when the cleanups averaged $1.29 per ton, $5000 per month in dividends were being paid.

The San Juan Oilfield of Utah

By George D. James*

A field in which oil seepages and shallow pockets of oil have been discovered. Deep drilling is to be undertaken to prove sands known to exist in depth.

*Mining engineer, 524 Judge building, Salt Lake City, Utah.

The present locations in the San Juan oilfield are in southeastern Utah, being approximately in lat. 37 deg. north and long. 110 deg. west, and in township 40, 41 and 42 south, and ranges 17, 18 and 19 east of the Salt Lake base and meridian. The extent of the field has not yet been determined, as with development along the various anticlines which exist through a large area with the same characteristics as those which have thus far been exploited, the existence of oil in all directions will probably be shown.

Probable Extension of Field

The San Juan river has evidently cut through oil territory east and west, and there is no reason why the area may not include the reservations of the Navajo and Pah-Ute Indians in New Mexico and Arizona to the south as well as the country north through Moab and in the direction of Green river; indeed, the entire region is practically unexplored with commercial possibilities of all kinds throughout.

The region is a portion of the Colorado plateau with an abundance of mountain ranges, conspicuous by a series of isolated buttes and monuments scattered throughout, forming a most unique representation of the results of erosion, where the sedimentary rocks were removed, leaving the laccoliths in comparative profusion. The anticlines which appear upheaved from the general horizontal strata continue for many miles, and where the San Juan river has cut its way through porous limestones which are formed between the Jura-Trias red sandstones above and the Upper Carboniferous sandstones below, seepages of oil are encountered. The deep cañons which occur along the river originated, not as a result of volcanic disturbances, but by the erosion of the sandstones.

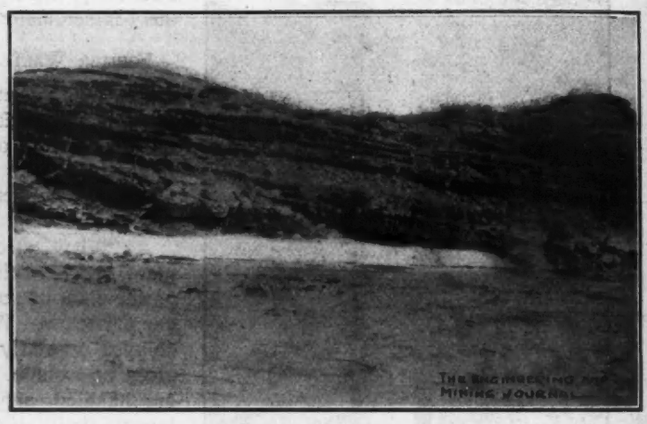
The history of the oil discoveries in this region may be traced back as far as 1901, when, after analysis of samples taken from seepages discovered while prospecting for placers, the results were sufficiently satisfactory to interest capital to the extent of placing a drill on the ground, but on account of the country where this first discovery was made being practically inaccessible and unsuitable for continuous operations, work was abandoned until 1907, when renewed attempts were made farther eastward and higher up the stream with results of oil and water, the sands being reached at 170 and 220 ft. These developments were prosecuted, however, more for the purpose of finding oil and validating the locations than in search for commercial quantities, and the work was discontinued for the time. So that while at present no shipments of oil are being made, it is quite probable that with systematic development oil will be found in satisfactory quantities.

About 10 months ago, and for some months previous, one well near Mexican Hat, 25 miles west of Bluff, yielded a daily production of about 55 bbl., which was consumed for fuel by the rigs then operating within a radius of eight miles. Since that time deeper wells have been sunk, the greatest depth being about 1700 ft., and in some it is stated that oil has been found. It is probably due to lack of funds that continuous work has not been carried on. In 1910, heavier rigs commenced to be placed on the ground with a view to reaching deeper strata and encountering some of the oil sands which have been proved to exist from the erosions along the river, and some of these have been cut.

Local Conditions Unfavorable to Development

It would seem that the field has labored under a series of misrepresentations in the way of costs of transportation, poor facilities for operation, delays in securing repairs, as well as the nature of the country surrounding. By the time machinery was hauled from the railroad by teams to the various points for drilling, it was found that the cost was far greater than represented. Delays in securing teams for the long and rough roads added to the expense, and when on the ground and extra tools were necessary on account of breakages, the time consumed in waiting for new pieces was longer than anticipated, and the additional cost of hauling in supplies of all kinds so reduced the drillers' bank accounts that in the majority of cases operations were suspended. Such is practically now the situation; not because the oil is not in existence, but because of local conditions. Much activity, however, is being expected in the near future; the scientific reports, together with the experience of those who have paid dearly for their efforts in the past, have brought matters to a basis which has resulted in the desire of those of ample capital to test thoroughly the oil resources of the region; from former developments, it would seem that satisfaction was gained when oil was encountered at a shallow depth; these findings, however, are probably the results of drainage or small confined pockets at varying depth to about 600 ft.; the deeper sands which have not been affected by erosion of the river are those now projected to be drilled through, and preparations are being made to sink

Entering the San Juan Oilfield in Southern Utah



San Juan River Near Mexican Hat

with heavy rigs to 3000 ft., if necessary, in various places through the field, when it will be seen if the San Juan field will become a permanent factor in the oil industry.

H. E. Gregory, of the U. S. Geological Survey, states that up to December, 1909, there have been 25 wells drilled, of which 20 were reported to have struck oil. The shallowest well was 30 ft. deep, the deepest 1300 ft. The average of all wells drilled was 248 ft. Eight distinct oil-bearing sands are represented in the Cañon section; in order, the Baby, Goodridge, No. 3, Mendenhall, Amber, Gooseneck, Blue Shale and Honaker, each being practical identical in character at each horizon. Oil was struck in each well drilled whenever the oil sands were penetrated, but the three lower sands have not been tested by drill. H. E. Gregory states that, "in making plans for the future, it should be noted that the deep cañon of the San Juan may have drained the oil from the field; this consideration, taken in connection with the formation afforded by the wells already drilled, indicates that there is little probabilitiy of finding gushers or wells of phenomenal yield; it seems reasonable to predict, however, that several wells will be found in this district from which oil may be pumped with profit."

Greatest Hope in Deep Drilling

Such a statement appears to me premature from the fact that operations for the most part have been conducted along the syncline rather than the anticline, also that depths below the erosions shown by the San Juan river have not been penetrated. The oils that have been hitherto found cannot be treated as those which will be of commercial value, as they may be classed more as seepages or small pockets which exist above the plane of the river and may have exhausted themselves at the face of the cañon walls; so that no criterion has yet been arrived at as to permanency with depth. The deepest well yet sunk, 1700 ft., is claimed to be 200 ft. below the bed of the river, and at present operations are stopped on account of a reported recent large finding of oil, and the well has been plugged; so that no definite or reliable data, it is to be regretted, can be forthcoming at present. It has been conceded, by those capable of expressing opinions from a scientific and experienced standpoint, that the San Juan oilfield is a deep-well proposition, and that 3000-ft. holes must be considered as a basis of development; and in this connection, options have been taken by those of influence and wealth on tracts of several thousand acres, with the intention to prosecute development on such a basis. The field is in embryo at the present time; stock companies with limited means have commenced their work without the knowledge of conditions, which accounts for the present status in the field.

The general conditions for oil discoveries were summarized[1] by Raymond S. Blatchley thus: "Another important necessity for the accumulation of oil and gas in pools is the pressure of structural features in the rocks. The sedimentary strata were deposited under water horizontally, or practically so, and the natural distillation of oil probably took place primarily while the beds were in that position. Subsequent disturbances took place, causing the strata to be folded, forming as it were an arch or dome in one case, and a corresponding trough or basin in the other. The arches are known an anticlines, while the depressions are called synclines. When these undulations took place, the water, petroleum and gas within the sand formation were forced to move and distribute themselves according to their specific gravities. The water was

Anderson Oil Company's Rig

the heaviest of the three fluids and, therefore, sought the synclines as far as possible, depending, of course, upon the porosity of the sands. Its tendency was to displace the oil and gas, forcing the oil to float on the water and the gas to rise still higher. The oil was enabled to rise as far as the water extended up the slopes of the syncline, while the gas was able to free itself from the fluids and rise to the highest place in the porous bed, usually the crests of the anticlines."

Oil Should Be Looked for in the Anticlines

W. T. Griswald[2], with reference to the Appalachian region, concludes: "In dry rocks the principal points of accumulation of oil will be at or near the bottom of the syncline, or at the lowest point of the porous medium, or at any point where the slope of the rock is not sufficient to overcome the friction such as structural terraces or benches. In porous rocks, completely saturated, the accumulations of both oil and gas will be in the anticlines, or along level portions of the structure. Where the area of porous rocks is limited the accumulation will occur at the highest point of the porous stratum, and where areas of impervious rock exist in a generally porous stratum, the accumulation will take place below such impervious stop, which is really the top limit of the porous rock. In porous rocks that are only partly filled with water, the oil accumulates at the upper limit of the saturated area. The limit of saturation traces a level line around the sides of each structural basin, but the hight of this line may vary greatly in adjacent basins and in different sands of the same basin. Under all conditions, the most probable locations for the accumulation of gas are on the crests of anticlines; small folds along the side of a syncline may hold a supply of gas, or the rocks may be so dense that gas may not travel to the anticline, but will remain in volume close to the oil." From a study of about 5000 well records in the Eastern Illinois fields, is was shown conclusively that the oil and gas occur along the crest of the La Salle anticline.

Drilling West of Volcanic Dike

In the San Juan field, near the center of hitherto attempted operations, a volcanic dike occurs, largely of a basaltic character, and it has been noted that to the east of this dike, approaching the syncline where the lowest contour is seen at Lime creek (the principal creek flowing north and south through the fields), water has been found in greater quantities than on the lands to the west of the dike, where the slope approaches the west anticline; it may reasonably be suggested, therefore, that in all probability the larger body of oil will be found in the latter portion of the field, as it would seem that the water has been cut off through the continuation of the dike to unknown depth. Up to the present time, the deepest wells have been sunk on the west side of the dike, toward the western anticline, and it is in this locality where the well at 1700 ft. depth is reported to have encountered a large body of oil.

Limestone is the characteristic rock in the San Juan oilfields, overlying the oil sands, which has allowed the oil to continue in place in the porous sands. Up to the present, the drilling has been practically confined to the sections along the synclines or near the creek beds and while the occurrences of oil may differ in various fields, yet as oil will naturally be found above the water, it is natural to presume that until drilling is done on

[1]Bull. 16, Ill. Geol. Surv., 1910, "Oil Resources of Illinois."

[2]Bull. 318, U. S. Geol. Surv.

the higher elevations of the field to considerable depth, no final conclusions can be arrived at, but on the data presented by Professor Gregory, showing that oil was encountered in each well wherever the oil sands were penetrated, the deduction may be made that oil exists in the San Juan field, and it remains for systematic drilling at depth to reach the lower sands which are undisturbed by erosions, to prove its continuity and commercial value, but all opinions hitherto expressed from a professional standpoint tend to show that at no distant period it will be known as a most valuable field of operations.

An analysis of the oil from the Oil City wells showed: Naphtha, 12.5 per cent. by volume; light burning oil, 21.2; heavy burning oil, 19.2; heavy oils, 43; coking and loss, 4.1 per cent.

Connection between Oil and Magnetic Variations

In my opinion, the occurrence of petroleum and local disturbances of the compass needle have some association with each other; George F. Becker, referring to the map showing petroleum deposits and lines of equal magnetic declination for 1905, says[2]: "Study of the map accompanying this paper justifies the statement that the coincidences between the occurrences of petroleum and local disturbances of the compass needle are too numerous to be attributed to mere accident or chance. There must, therefore, be a direct or an indirect historical connection between the two phenomena in the regions of coincidence. . . . What the map does prove is that petroleum is intimately associated with magnetic disturbances similar to those arising from the neighborhood of minerals possessing sensible magnetic attraction, i.e., iron, cobalt or magnetite. Henceforth no geological theory of petroleum will be acceptable which does not explain the association."

In making a series of triangulations from time to time in the San Juan oil-fields, it was noted that the magnetic variations in some localities were extremely erratic, varying from 14 deg. 30 sec. E. to as high as 17 deg. 30 sec. E. in a distance of six miles with intervening sudden changes; so that where in ordinary cases the variation is turned off for approximate work, where solar observations could not be taken, it was found to be unreliable, with the result that all courses had to be determined by deflections after Polaris or solar readings were secured. It was found that within one-half a mile and less, the variations previously obtained could not be used.

It would seem, therefore, to tend toward the probability that oil exists in that section especially where the greatest disturbances were noted, and these changes occur more in a southerly direction than northerly, in the region of the San Juan river. The area is too great to make full deductions without considerable time as to where the greatest disturbances are to be located, but I found sufficient to uphold the statements which Mr. Becker has advanced.

[2]Bull. 401, U. S. Geol. Surv., 1909.

Michigan "Air Blasts"

Hancock Correspondence

The recurrence of severe "air blasts" in the copper country of Michigan revives the question as to their cause. It has been stated, and is generally believed, locally, that the "air blasts" are due to the sudden displacement of large volumes of air, caused by the falling of great areas of the unsupported hanging walls in the old workings of some of the deep mines, notably the Quincy. A great deal of evidence tends to support this, but a brief review of the phenomena, with the attending results, leaves room for doubt as to whether or not the dropping of this rock is the initial cause.

The first serious shock is believed to have occurred during the summer of 1904. Data available indicates that it was at this time that serious caving was recorded in the old Atlantic mine, situated about two miles south of Portage lake. This first shock attained the proportions of a local earthquake and it was stated at the time that the tremors were felt as far as Marquette, about 90 miles distant, and at the Soo, several hundred miles from Houghton. It is certain that the blast was severe in the immediate vicinity of Portage lake, and was felt distinctly on the shores of Lake Superior, 10 miles north at what is known locally as the canal. Windows, china, pictures and chimneys throughout the district were broken, and all the effects of a light earthquake were noted. Lighter blasts occurred from time to time. During this period, caving continued at the Atlantic mine and finally in 1906 necessitated the abandoning of the property.

About this time serious caving began at the Quincy mine. Up to the present, this has accompanied each "air blast" and several times has caused temporary shutdown of one or more of the Quincy shafts, contiguous to the affected territory. The disturbances occurring in the last few weeks are apparently as severe, as regards surface evidence, as those of 1904 and 1906, and some of the reports regarding them are of particular interest. Several minor shocks preceded the main one, which is said to have centered in the vicinity of No. 7 shaft at the Quincy mine. Buildings on both sides of the lake were shaken, pictures knocked from the walls and crockery broken. Several chimneys were also dislodged. A boat unloading coal at one of the docks was noticeably swayed.

Some of the attending circumstances of many previous shocks are interesting. It has been noticed that before any tremors are observed, there occurs a dull but distinct thud, similar to that caused by a heavy object falling on soft earth. An instantaneous pause follows, after which come the vibrations. With the exception of the severe shock during the summer of 1904, it is safe to say that the great majority of the others have followed sudden changes, of some sort, in the weather and have happened in the autumn or spring months. The relation is doubtful but interesting.

A somewhat discredited explanation attributes the "air blasts" to a slipping of certain rock strata. This would place the disturbances in the earthquake class and in this connection it is interesting to note the remarks of a local pioneer. He states that the region was subject to tremors and quakes before any mines were opened. It is said that the "Indians knew of the country as 'rolling island' and entertained a wholesome fear of the district, believing it was the habitat of evil spirits." To date there does not appear to be a satisfactory or convincing explanation.

The Farnham Electrolytic Cell

An interesting development in commercial electrolysis with insoluble anodes is that described in F. F. Farnham's recent patent (U. S. pat. No. 1,006,836). While designed primarily for the treatment of pickling liquors, it seems to admit of a wide application in electrolytic refining. The object of the invention is to do away with certain objections to the ordinary diaphragm cell, notably the quick deterioration of the diaphragms in acid electrolytes, and the mutual contamination of the anolyte and catholyte by each other. To effect this purpose, the anodes are themselves hollow cells, pierced with a multiplicity of holes. The diaphragms, of such material as asbestos, burlap or canvas, are secured to the outside of the anode, and with this rigid backing are in but little danger of disintegration. The exhausted anolyte is removed from the inside of the cell, the pipes from all the anode cells being connected in parallel, and as each portion of it must slowly seep through the diaphragm and pass through the perforations, the sides of the orifices acting as anode surface, it follows that a remarkably pure, regenerated solution can be pumped away. The untreated solution flows into the cathode space. A vertical section of the typical cell is given which shows the electrolyte feed pipes *A*, the cathodes *B*, the hollow anodes with supported diaphragms *C*, the anolyte pipes *D* and the final outflow pipe *E*. The cathodes are removable, so that after any great deposit of metal is formed, they may be removed and new starting sheets suspended.

The Tonopah Extension Mill

By Claude T. Rice

A direct all-slime cyaniding system has been substituted for the combined concentrating and cyaniding method originally employed. Trent agitators are used, followed by vacuum filters and zinc boxes.

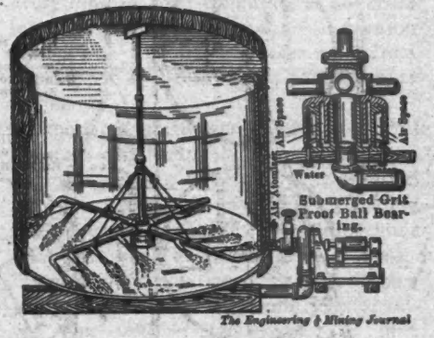
The Tonopah Extension mill is the newest in the Tonopah district. Its equipment was described in the JOURNAL of May 21, 1910. On that account, in this article, I will discuss mainly the milling operations and the results that have been attained now that the mill has been in operation about a year and a half.

TRENT AGITATOR USED

The feature of the mill is the use of the Trent agitator. This agitator was first used in a mill of any size at the Montgomery-Shoshone property, at Rhyolite, which, by the way, is under the same management as the Tonopah Extension. Since then the main installation of this device has been this one at the Tonopah Extension property, although some Trent agitators are in use elsewhere. This agitator depends upon a centrifugal pump to circulate the pulp in the agitating tank, and upon compressed air to do the aëration and to aid in the agitation. In fact, the air does the main agitation, but instead of the air being fed into a central tube as in the Pachuca tank, it is fed into the intake end of the centrifugal pump, and supplied to the charge by means of jets issuing from rotating arms. In this way the air is greatly comminuted, and the whole mass of the pulp kept in a boiling, frothing condition, due to the many minute air bubbles which rise to the surface. Indeed, so great is the impregnation of the pulp with air, that there is a swelling of the charge amounting to 4 in. in a hight of 16 ft., or about 2 per cent., when air is turned into the agitator; and so minute are the bubbles that it takes fully a minute for them to rise to the surface of a charge a distance of about 16 ft. Settling of the coarse sand and consequent building up of a sandy deposit on the bottom of the tank is prevented by pointing the jets on the rotating arms slightly downward so that the pulp, which issues from the jets along with the air, has a scouring effect.

In the first agitators the feed for the centrifugal pump was taken off at the bottom and returned over the top through a down-comer to the rotating arms, but now the feed is drawn off at the top and returned through the bottom of the tank so the pump is working against a strictly balanced head, and consequently less power is required in circulating the pulp. A special type of foot-step bearing, which seems to be absolutely grit proof, is used so that no trouble arises from that part of the agitator. The air for the agitator is supplied by a small air compressor, which compresses the air to 20-lb. pressure.

The agitation is excellent. It is the use of a centrifugal pump for doing the circulating of the pulp that at first prejudices one against the Trent agitator; especially a person who has used such a pump for circulating pulp about a concentrator, or in the concentrating department of a cyanide plant. But there is an important difference, for in such work the pump is working against a considerable head and handling a pulp that contains much sand. In the Trent agitator the centrifugal pump is working against only the friction and velocity heads, as the load is a balanced one, and at the Tonopah Extension mill, it is handling a pulp 92 per cent. of which will pass a 200-mesh screen, and all of which will pass through a 100-mesh. Moreover, the pump is not running at a high speed, the 4-in. pump makes only 400 r.p.m., giving a peripheral speed of less than 2500 ft. per minute.



SKETCH OF TRENT AGITATOR USED AT TONOPAH EXTENSION MILL

These conditions consequently are far different from those under which most centrifugal pumps are working, and they are such as to favor the centrifugal pump to the utmost. In a centrifugal pump the cutting effect of the moving pulp increases greatly with the speed of the pump and the head against which the pump is working, and below a certain pressure and speed there would seem to be a point at which the cutting effect of the moving pulp must become extremely small. As the speed of these circulation pumps is low and the pressure practically nil, it becomes merely a question of keeping the grit out of the bearings and other places where it might work in and grind. As the head is small on these pumps, only about 16 ft., the problem of keeping the grit out of the bearings is a much less difficult one to face than that when working against a considerable pressure. In the pump used at this mill, this wear is small as the life of a pump runner is about six months, and of the liner about the same. In fact, the cost of repairs for each centrifugal pump averages only $5 per month.

As can be seen, there can be no regular cycle for the pulp flowing through this agitator, so that if there is anything in the theory that extraction is better when the pulp and the solution are circulating in different cycles so that the same particles of ore and solution do not stay together throughout the whole agitation, this machine seems to answer agitation requirements quite well.

DIRECT CYANIDING NOW PRACTISED

The ore going to the mill assays about $13 per ton, and is quite similar to the general run of sulphide ore at Tonopah, except that it is lower in grade and there is no adularia vein matter as is the case in some of the orebodies at Tonopah. For treating this ore in which the silver minerals are principally argentite and stephanite, the mill was originally designed to concentrate before and after the product was crushed in the tube mills, but after the mill was in operation about eight months, experiments were conducted to determine whether or not it would be economical to discontinue slime concentration. It did not take long to determine that slime concentration was unnecessary, as the extraction was apparently as good without slime concentration as with it, and considerable money could be saved in the expense of making and marketing these concentrates. This change eliminated the use of the Frenier pumps, Callow cones and Deister slime concentrators.

Shortly after this change was made, experiments were conducted with the object in view of discontinuing coarse concentration and making the mill a pure cyanide slime mill, in which the gold and silver in the ore would all be recovered by means of cyanide solution and bullion would be the only product to be sold. These experiments proved successful, so that all concentration was discontinued about a year after the mill was put in operation.

The results obtained for the six-months' run since the mill was changed are: Gold extraction, 93.63 per cent.; silver extraction, 89.74 per cent.; average total extraction of gold and silver in ore,

90.85 per cent. During this time 25,079 tons of ore were treated at a cost of $3.186 per ton, while the consumption of sodium cyanide per ton of ore was 2.631 lb.; of zinc per pound of bullion, 0.882 lb.; of pebbles per ton of ore, 5.597 lb.; of lead acetate per ton of ore, 0.872 lb.; of lime per ton of ore, 4.085 lb. The cost of marketing bullion per ton of ore is: Refining, $0.146; express, $0.063; total, $0.209.

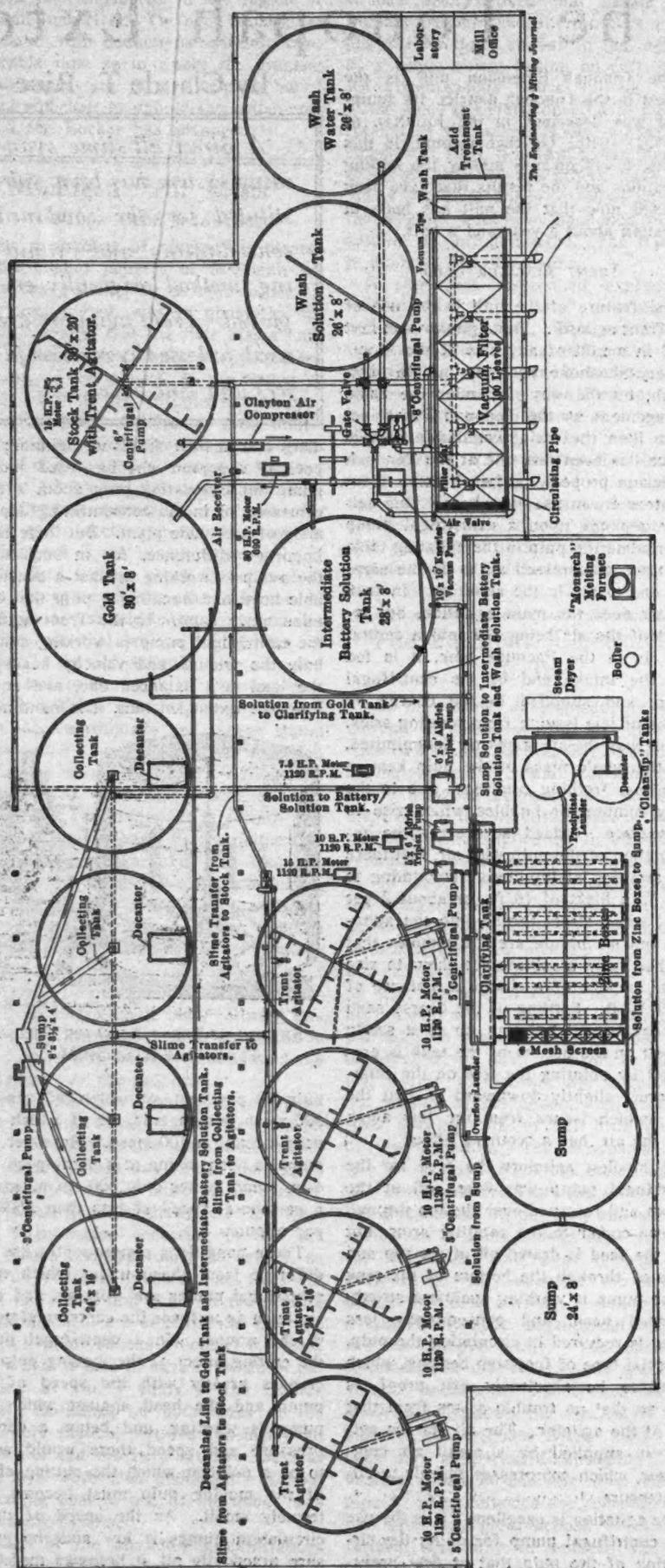
Mine and Dump Ore Treated

The mill is treating 145 tons of ore per day. This ore comes mainly from the mine, but a small portion, not over one-fourth, comes from the dump. The coarse crushing is done in a separate breaker-house near the shaft, in a gyratory crusher that breaks the ore to 1½-in. size. An inclined belt conveyer takes the ore to the battery bins in the top of the main mill building, where a stationary tripper is used to dump the ore. This is equipped with a windlass for moving it along the top of the bin. The tripper, as bought, had a pipe through which to discharge the ore, but this clogged up so that it became necessary to put on a box instead.

The battery bin, which holds 450 tons, is built with a flat bottom, as with that type of construction there is no tendency for the bin, when full of ore, to push the battery frames out of plumb. In order to protect the bin from wear the front and sides are lined with 40-lb. rails, running vertically up and down the bin. Challenge feeders supply the ore to the stamps, 30 in number, which are arranged in groups of 10, so that each two five-stamp batteries has its own driving motor. The stamps, which weigh 1050 lb., make 101 drops 7 in. high per minute. A "ton-cap" screen having openings 0.036 in. wide and equivalent to about 14 mesh, is used on the batteries, and the crushing is done in cyanide solution having a strength of 3 lb. KCN per ton. The stamp duty is 4.8 tons per 24 hours.

Ore All Slimed

The pulp from each 5-stamp battery goes to two Dorr classifiers that feed the sands to two tube mills. The classifiers are fitted with the bell-crank mechanism which was first devised for them at the Consolidated Mercur plant, and their beds are made of steel with a slope of 2 in. per foot. The slime product from the classifiers, which contains 92 per cent. that will pass a 200-mesh screen, goes to a sump, from which it is pumped by means of a centrifugal pump to the settlers, while the sand product from the two Dorr classifiers goes to two 5x18-ft. tube mills of the trunnion type fitted with El Oro lining. Imported pebbles are used in the mills, and the pulp from the tube mills is all returned



Plan of Slime Plant of Tonopah Extension Mill

by a bucket elevator to the Dorr classifiers, making a closed circuit. This has been found to be much more satisfactory than classifying the tube-mill product in hydraulic classifiers and only returning the sands to the Dorr classifiers.

The lime for neutralizing the acid in the ore is added at the Dorr classifiers, so that it is thoroughly mixed with the ore and slacked as the pulp goes through the tube mills. In this way any coating and blinding of the battery screens is avoided as would be the tendency, even when the amount of lime used is small, were it added at the batteries.

The floor under the tube mills is of concrete, put in so as to slope to the boots of the elevators as a sump. Consequently, any slopping from the pumps or the tube mills is easily returned to the classifiers without any loss.

The settlers are 24 ft. in diameter and 16 ft. high, with a false bottom in them having a slope of 25 deg. to aid in the discharge of the thickened pulp. As a further protection a hose and pipe is provided that is attached to the compressed-air pipe supplying the agitators, so that by means of this pipe any pulp that tends to build up on the sides of the settlers may be churned into suspension again. None of the settlers are allowed to overflow, but instead the clear solution on top of the settling pulp is decanted off from time to time, so that all four of the settlers are collecting and discharging at intervals all the time. The decanted solution is sent either to the gold tank or the intermediate gold tank, according to its richness, while the pulp is drawn off from the bottom of the settlers at a specific gravity of 1.2 and goes to a 6-in. Krogh transfer pump that sends it to one of the four agitators.

Agitation

The agitator tanks are 24 ft. in diameter and 16 ft. deep, with a capacity of 70 tons of dry slime. The arms carrying the air jets in these agitators are rotated by the force of the discharge at a speed of 3 r.p.m., and the nipples on the different arms are staggered so that each travels around at a different distance from the center. The jets point slightly downward so as to keep the sand in the pulp from settling on the bottom.

Each tank is fitted with a 5-in. centrifugal pump. These are cast at the local foundry so that runners can be cheaply replaced. These pumps turn over the pulp in a tank once in 105 min., and testing has shown that it takes 5 h.p. to run a pump. Other than the upkeep on the centrifugal pumps, the repairs amount to practically nothing, as the foot-step bearing gives no trouble. The amount of air fed to each tank is small and does not amount to over 13 cu.ft. per min. In the tanks the pulp is given an agitation lasting 48 hours.

At the agitators the solution is built up to a strength of 4.5 lb. KCN per ton, after lead acetate has been added. This acetate is dissolved in sump solution, and lime added to prevent the decomposition of the cyanide on account of the free acetic acid, which the lead acetate sometimes contains. From the agitators the charge is transferred to a 30x20-ft. gravity stock tank, fitted with a Trent underfeed agitator, which not only keeps the pulp from settling, but gives the slime further agitation.

Vacuum Filter Used

The filter is of the vacuum-leaf type containing 100 leaves, 5x10 ft. in size with grooved wooden strips between the canvas instead of cocoa matting. These leaves are washed, four each day, in muriatic acid having a strength of 0.3 per cent., so that once a month all the leaves in the tank are gone over. In filtering, a cake 1½ in. thick is formed, no matter how long that takes, as it has been found that a larger capacity can be obtained from the filters in that way than if a cycle of fixed length is used. Formation of the cake is begun with a vacuum of 8 in., the flow of filtered solution to the gold tank being watched, and as the outflow diminishes, the vacuum is increased gradually to the limit which, with everything in good condition, is about 22 in. In washing the cake the full vacuum is kept on. The slime is discharged from the hopper by 10-in. quick-opening gate valves.

Although no fixed cycle is adhered to, still the rate of filtering is approximately as follows: Filling filter box with pulp, 15 min.; forming cake, 90 min.; pumping back excess of pulp, 15 min.; filling filter box with wash solution, 15 min.; washing with sump solution, 2 hours; pumping back excess solution, 15 min.; filling filter box with fresh water, 15 min. (only enough being used to displace the cyanide solution in the cake); dropping cake, 20 min.; total time, 5 hours 5 minutes.

Precipitation by Zinc Shavings

Zinc shavings are used for precipitating the gold and silver, and the whole precipitation department is conveniently laid out on a rather novel line. The head solution from the gold tank is drawn off by means of a floating hose and goes first to a wooden box filled with excelsior to remove any slime that may pass the filter leaves. The gold tank is also connected with the 6-in. centrifugal transfer pump, so that any slime which collects in the bottom of the gold tank can be transferred to the stock tank. From the excelsior clarifying box, the solution discharges to the eight precipitation boxes, each of which has six compartments. These boxes have hopper bottoms, and launders under them which take the precipitate at cleanup to the filter sumps. In the first compartment of each box is placed the short zinc screened out from the precipitate as it passed through an eight-mesh screen, long shavings being used in the other compartments entirely.

There are two sumps used in tandem. Each of these is fitted with a canvas filter bottom, connected with an Aldrich triplex pump to aid in draining off the solution from the precipitate and to return the filtered solution to the head of the zinc boxes to guard against any loss that might result from leaky filters. The launders take the precipitate from the zinc boxes directly to the first of the sumps where practically all the precipitate is caught, for the second tank is used merely as an overflow to guard against any loss from flooding.

Oil Furnace for Refining

In the sump tanks the precipitate is sucked to about 20 per cent. moisture and is then shoveled to the steam-heated drying pan placed alongside the sumps. On this pan the precipitate is dried to about 8 per cent. moisture and then is mixed with fluxes in the following proportions: Precipitate, 200 parts; borax glass, 25 parts; soda ash, 15 parts; silica slime from Butters filter, 4 parts. The precipitate after being mixed with these fluxes is placed in paper bags, charged into a No. 275 graphite crucible and melted in a Steele-Harvey furnace. This is fired with crude oil atomized by means of an air blast. There is no cutting down of short zinc, as whatever zinc goes into the precipitate is fluxed off during the melting of the bullion. The precipitate runs about 750 fine in gold and silver, while the bullion obtained is 950 fine in silver and 10.5 fine in gold. Owing to the convenient way in which the precipitation department is arranged, it is possible to clean up the boxes and pour bullion into bars within 24 hours after cleanup begins, although nearly a ton and one-half of precipitate is produced each time, as two cleanups are made a month. This is considerably faster than would be possible with zinc dust, and the bullion obtained is higher in grade.

It takes 290 h.p. to run the whole plant, and in operating it a crew of 13 men is employed on three shifts; 3 batterymen (who also attend to mine air compression); 3 tube-mill men; 3 solution and filter men; 1 helper; 1 zinc-room man, who also conducts experiments; 1 conveyer man and a superintendent.

The plant cost erected $132,000. It was designed by John G. Kirchen, general manager of the company.

The Rio Tinto Company has announced a dividend for the six months ended June 30, 1911, of 2½ per cent. on the preferred and 22½ per cent. on the common stock, or $2,029,050 total disbursement.

Fluorspar Mining at Rosiclare, Ill.

By Ernest F. Burchard*

Fluorspar occurs associated with lead and zinc in fault-fissure veins. Coarse spar is prepared for market by sorting; the finer material is crushed and cleaned in jigs.

Fluorspar, a compound of calcium and fluorine (CaF_2) is a crystalline, clear or colored glass-like substance. It occurs in fissure veins in limestone, sandstone, and shale. Such veins are often found in fault fissures, and are not remote from intrusive igneous rocks. Fluorspar therefore occurs in associations similar to those of lead and zinc ores, and, in fact, is often found with those ores. The other principal veinstuffs accompanying fluorspar are calcite and quartz; clay is also found in openings where it may have been carried down from the surface. Fluorspar has been mined in Arizona, Colorado, Illinois, Kentucky, New Hampshire, New Mexico and Tennessee, but only Illinois and Kentucky have so far been important producers of this mineral, and of these two States Illinois produces by far the greater quantity.

Production and Markets

Fluorspar is a mineral of relatively moderate commercial value as compared with metallic ores mined under similar conditions. According to report to the U. S. Geological Survey there were 69,427 tons of domestic fluorspar, including gravel, lump, and ground varieties, marketed in the United States in 1910 at a price of about $6.20 per ton. Of this total, 61,136 tons were sold as gravel and lump spar, at an average price of $5.58 per ton at the mines, and 8291 tons were sold ground, at an average price of $10.72 per ton f.o.b. cars.

Fluorspar is used principally in the iron and steel industries, as a flux in blast furnaces and in basic open-hearth steel furnaces. It is estimated that about 80 per cent. of the American fluorspar output, mainly in the form of gravel spar, is consumed in the manufacture of basic open-hearth steel. It is also used in the manufacture of glass and of enameled and sanitary ware, in the electrolytic refining of antimony and lead, the production of aluminum and the manufacture of hydrofluoric acid. The use of fluorspar is increasing in practically all of these industries.

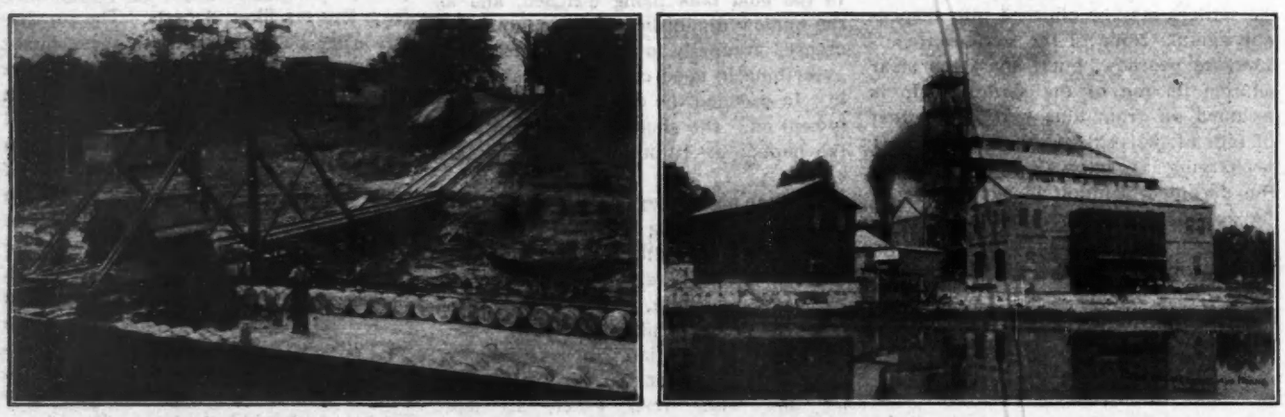
The demand for American fluorspar at Pittsburg, Birmingham and other steel-making centers during 1910 was apparently greater than the capacity of the mills operating in the Illinois-Kentucky district. Although the imports were exceedingly high, notwithstanding the import duty of $3 per ton imposed in 1909, the market for domestic spar does not appear to have been seriously affected by the quantities of fluorspar imported.

The conditions in the open-hearth steel industry have a most direct bearing on the production of fluorspar, since the greater part of the gravel spar produced is used in the manufacture of basic open-hearth steel. The increase in the quantity of basic open-hearth steel in 1910, as compared with 1909, amounted to 1,874,857 long tons, or nearly 14 per cent.

The Rosiclare Deposits

The fluorspar deposits of southern Illinois, the largest and richest yet discovered in the United States, occur in Hardin and Pope counties on the Ohio river about 75 miles above Cairo. This district was studied and mapped by H. F. Bain[1], in 1903. The deposits occur in veins filling fault fissures. The vein material consists essentially of fluorspar and calcite. Associated with these minerals are minor quantities of the lead and zinc sulphides, galena and sphalerite.

The veins in the immediate vicinity of Rosiclare and Fairview, Hardin county, have been exploited to the greatest extent, and are probably the most extensive in the district. Mining has been carried on almost continuously along the vein on the properties of the Rosiclare and Fairview mines, a distance of more than a mile, first on the outcrop, and then underground, by means of shafts and stopes. For the greater portion of this distance the stopes have been 10 to 20 ft. wide in rather clean ore, but the vein is much narrower in places. The ore has been proved to a depth of more than 500 ft. in the Fairview shaft and to 335 ft. in the Rosiclare shaft, and it is probable that it will be found to extend to a greater depth than will be practicable to mine it.



Loading Wharf, Headframe and Mill of the Rosiclare Fluorspar Mines

The accompanying table shows a number of chemical analyses of cleaned spar from the Fairview-Rosiclare vein.

The Mine and Mill

Fluorspar is mined at the Rosiclare Lead and Fluorspar mines by overhand stoping. One shaft is 335 ft. deep, but the main level is 235 ft. below the surface. Local pinching and swelling is characteristic of the vein, the width ranging from a few inches to 22 ft. There are large quantities of good ore still available above and below the main level, in both directions from the shaft, but in places large bodies of calcite exist.

A new steel mill has been built at the Rosiclare mine designed to treat 500 tons of crude ore per day. Several new features are being successfully exploited at this mill, which is so complete that it merits detailed description. The three-

Note—Published by permission of the director of the U. S. Geological Survey.

*Geologist, U. S. Geological Survey, Washington, D. C.

[1]Bull. 255, U. S. Geol. Surv.

compartment shaft has recently been reconstructed. Two of the compartments 5 ft. 5 in. by 4 ft. 4 in., are for hoisting. The pump compartment 5 ft. 5 in. by 3 ft. 8 in. The mill consists of three large buildings as shown in one of the accompanying illustrations. The sizing and sorting building, with a shaft at the south end, stands in the middle, with the power house and grinding building to the west and the concentrating building, or jig house, to the east. All the buildings are approximately 90 ft. long. The middle building is 20 ft. wide at the base, and the two other buildings are 36 ft. wide. The alleys between the middle building and the other buildings are 14 ft. 6 in. wide. The hight to the top of the headframe at the center of the wheel above the shaft is 84 ft. The hight to the roof of the middle building is 71 ft. 6 in. The hight to the grizzly is 59 ft., to the screen floor 37 ft. 6 in., and to the picking floor 25 ft. The two outside buildings stand 30 ft. to the eaves, and the hight to the mill floor in the grinding building is 15 ft. The frame of the middle building is of medium steel, and the covering down to the picking belt floor is of 22-gage, galvanized, corrugated steel. The floor of the grinding room and machine shop is of concrete, supported by high-ribbed, steel arches. The walls of the outside buildings are of brick, and the roofs are of corrugated steel.

TYPICAL ANALYSES OF ILLINOIS FLUORSPAR

CaF_2	SiO_2	$CaCO_3$
88.85	3.4	.....
87.07	3.12	8.96
86.31	4.30	7.57
86.60	2.38	10.94
85.35	8.17	4.50
83.49	4.0	7.67
84.80	3.51	8.29
84.50	3.85	8.27
85.63	3.82	9.21
88.67	5.13	4.49
85.61	6.05	4.22
85.57	6.76	2.26
86.10	7.39	2.14
86.87	4.73	4.44
98.27	0.58	0.27
96.62	1.67	0.79
98.30	0.46	0.46
95.38	0.47	3.55

The power plant consists of two 150-h.p. Chandler & Taylor boilers, and two 200-h.p. boilers made by the Lyons Boiler Works. Kentucky coal is used, and three boilers are considered capable of running the plant at its full capacity. An induced draft is used, built by the American Blower Company, making a tall smokestack unnecessary. In the engine room are one 125-h.p., one 175-h.p. Ball engines, one Ingersoll-Rand air compressor with a capacity of 550 cu.ft., and an Ingersoll-Rand straight-line compressor with a capacity of 1100 cu. ft. Electrical power is supplied by a Westinghouse 75-kw. generator, direct connected to a Ball engine, and a Fort Wayne 125-kw. generator also connected to a Ball engine. The water supply is taken from the mine, and is softened by a Eureka water softener and purifier, having a capacity of 6000 gal. per hour. There is also used a 600-h.p. Cochran water heater which utilizes the exhaust steam. The water-supply system comprises a supply tank on the hill to the west of the mill, having a capacity of 10,000 gal. A Nye pump having a 4-in. discharge and a capacity of 375 gal. per min. handles the mine water. In the spring of 1911 only about 150 gal. per min. were pumped from the workings. Barrels for the ground spar are made in the mines' cooper shop.

Coarse Spar Is Hand Sorted

From the mine the spar is hoisted to the top of the mill in one-ton steel cars having side dumps and gable bottoms. From the cage the cars are run out on a steel platform from which they are diverted to tracks running out over grizzlies. The spar is dumped on the grizzlies, which are constructed of steel bars 1½ in. wide by ¾ in. thick on top and ½ in. thick underneath, with 2½-in. spaces. The grizzlies are inclined toward two 24-in. steel Zimmer apron conveyers on each side. From the oversize, No. 1 lump spar is picked and thrown on the conveyers. The common spar not passing the grizzly is shoveled into a No. 5, Style C, Symons crusher. The total capacity of the grizzlies is about 100 tons of material at one time. The material passing the grizzly and the crusher feeds flows into two 150-ton steel bins on the floor below. These bins feed into two Zimmer shaking screens on the floor next below. These screens have steel frames 17 ft. by 2 ft. 9 in., with bottoms of heavy wire with meshes about ½x1⅛ in. The lump spar is delivered by the apron conveyer to a Dodge rotary drier 25 ft. long by 36 in. diameter.

The drier is supplied with hot air from the top of the boilers, which is blown through the system at the rate of about 1100 cu.ft. per min. by means of a 20-h.p. motor. As the ore leaves the drier it falls on a "butterfly," which diverts the material as desired, either into a bin for No. 2 lump spar or through a modified Edison tower into a No. 3 Symons crusher. The hot air ascends through the Edison tower and the chute, giving the ore the benefit of a longer exposure to the heat. The No. 2 lump spar may be drawn directly from the bin, barreled and shipped. The No. 1 spar passes through the Symons crusher, which feeds by gravity into a Griffin mill driven by a motor. Space has been left in the compartment in which the Griffin mill is situated for two additional units. The crusher and mill stand on a concrete pier built partly above the level of the second floor. The Griffin mill discharges through a 30-mesh No. 30-wire screen into a screw conveyer, which moves the ground spar at the rate of about 47 ft. per min. to four storage bins. Each bin feeds into barrels which stand on packers. The barrels weigh 550 to 610 lb. when filled. The capacity of this packing room is about 10 barrels per hour, or 30 tons per day.

Fine Material Concentrated

From the Zimmer shaking screens the undersize is carried by water through a 9-in. pipe to the jig house, while the oversize of the screens falls on a picking belt, on which nine to 15 men may work. On the picking belt separation is made by hand of the larger fragments of lead and zinc ore, calcite, waste and fluorspar. Lump spar can thus be picked if desired in order to increase the quantity secured by picking on the grizzly above. The waste and calcite are thrown directly to chutes leading to their respective bins, while the lead and zinc ores pass through short chutes to separate troughs just below the picking belt, and are moved by a double Zimmer shaking conveyer to separate 13-in. Symons disk crushers.

The overrun of fluorspar from the picking belt passes in the opposite direction to a 24-in. Symons disk crusher. The lead and zinc ores discharged from the respective disk crushers are carried by water through pipes to Richards pulsator jigs in the jig house. From the 24-in. disk crusher the spar and fine lead and zinc ores are fed into a bin. This bin feeds into the same service pipe which receives the undersize from the Zimmer shaking screens. This service pipe feeds into a Foust rougher jig containing five cells. The ore from the rougher jig goes to a Foust cleaner jig having six cells. Provision is made for catching the lead from the rougher jig and for taking care of the tailings. Between the rougher jig and the cleaner jig are several pumps. The system is flexible. A trommel and another 13-in. Symons disk crusher treat all material over ½ in. in size before it enters the rougher jig. The lead and zinc ores coming from the disk crushers are treated by two four-celled Richards pulsator jigs. About 90 per cent. of the normal ore consists of concentrates of fluorspar, galena and sphalerite (zinc blende). The galena recovered constitutes about 1 per cent. of the concentrates, and the sphalerite less. It is planned to treat a large quantity of rich tailings from the old mill as soon as there is an opportunity.

Small Quantity of Tailings Produced

The milling of fluorspar offers rather difficult problems, for unlike most ores, the bulk of the product must be saved, and the waste which must be eliminated constitutes relatively a small percentage. In addition, the separation of the lead and zinc from the fluorspar is difficult, particularly where the former minerals are present in such small proportion, yet it is essential that they be almost completely removed, since the presence of

sulphides renders the fluorspar of little value as a flux in steel making. Moreover, if the separation can be completely and economically effected, the lead and zinc ores recovered materially assist in paying the expense of cleaning the ore.

Under normal conditions about 57 men are employed above ground, including office force and superintendents, and about 48 men underground. This mill was designed for a capacity far in excess of any other mill built to treat fluorspar and associated ores, and it is reported to be amply fulfilling the expectations of its owners.

PRODUCTS SHIPPED BY RIVER AND RAIL

The products of this mill, lump, ground and gravel spar are carried to the Ohio river over an electric tramway 3300 ft. long, and are then loaded on barges and towed to Evansville, Ind., and to Golconda and Shawneetown, Ill. The river may be closed to navigation by ice for a short period in the winter, or by low water for a short period in the summer, and to protect their customers, the Rosiclare company endeavors to maintain a stock of about 3000 tons of fluorspar of all grades on the tracks of the Baltimore & Ohio Southwestern railroad at Shawneetown. Duplicate boiler, air compressor and current-generating units are maintained to provide against breakdowns in the power plant. A large Prescott mine pump has been installed at the bottom of the main shaft to supplement the main pumping outfit in emergencies.

The Rosiclare mine has had a unique and interesting history. The mine is the property of John R. McLean, of Washington, D. C., and has been operated continuously for 70 years, the greater part of this time in possession of Mr. McLean and his ancestors. The superintendent is W. A. Moore. For the last three years the products of the mine, consisting of selected lump, gravel, ground, and acid ground grades of spar, have been sold and distributed by Rogers, Brown & Co., of Cincinnati.

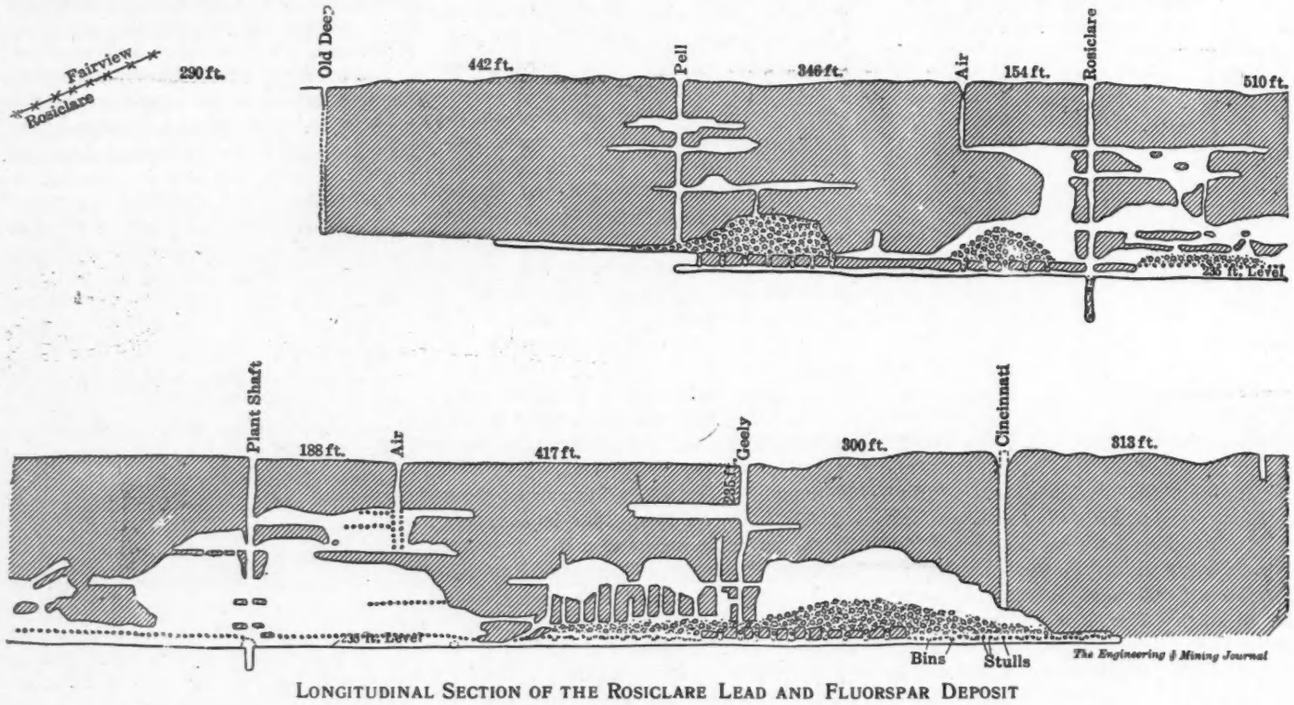
The completion of this uptodate plant for the commercial preparation of fluorspar, and the improvements at the mine, have had a marked effect on the town of Rosiclare. The spirit of progress and enthusiasm manifest promises well for the district and its inhabitants.

The Perschbacker Drift Mine

The Perschbacker[1] or Lucretia mine, also called the Magalia mine, is one of the best known drift mines in Butte county, California. It is on a small tributary to the main Magalia channel, but has proved rich in unusually coarse gold, which in places almost covered its bedrock. The total production is over $1,000,000. The mine is situated on Little Butte creek, two miles north of Magalia, at an elevation of about 2500 ft. The first discovery was on the West bank of the creek; this was the old Perschbacker channel, which, was followed to the junction with a larger channel, which above this junction seems to split, one of the branches possibly connecting with the Princess channel, two miles farther north. The main branch may be called the Little Magalia channel.

The Perschbacker channel is a narrow and steep tributary, with a little angular wash and coarse gold. Its grade is 282 ft. in a total mined distance of 3500 ft. in which it gradually decreases from 8 to 3 per cent. The Little Magalia channel, mined for a distance of nearly a mile, falls 186 ft. in that distance. The mining was done from a perpendicular shaft, sunk 512 ft. to bedrock, through "ash, lava, basaltic sand, and volcanic gravel." The flow of water was heavy, the maximum being 625 gal. per min. At a depth of 452 ft. the shaft encountered metamorphic gravel, which continued for 50 ft. to bedrock.

The wash in the Little Magalia channel is 50 to 60 ft. wide, the pay gravel being 6 ft. high from bedrock. The bedrock is slate alternating with serpentine; one streak of limestone was crossed. Two faults were met, with sharp southern up-throws of 5 and 34 ft. The mine was idle in 1901.



LONGITUDINAL SECTION OF THE ROSICLARE LEAD AND FLUORSPAR DEPOSIT

The Princess or Aurora mine is a mile northeast of the Magalia, and is supposed to be on an extension of the same channel. The incline shaft is 330 ft. deep at an angle of 32 deg. The channel is said to be 70 ft. wide and to contain three feet of blue gravel with large cobbles and boulders, and coarse gold on serpentine bedrock.

In 1910 the sales of mineral water in the United States amounted to $6,357,590, the production being 62,030,125 gal., as reported by George C. Watson, of the U. S. Geological Survey. Minnesota was the greatest producer, with New York a close second. Wisconsin, however, obtained the greatest income from her mineral waters; New York, second, and Indiana, third.

[1]Excerpt from Professional Paper 73, U. S. Geol. Surv., "The Tertiary Gravels of the Sierra Nevada of California," by W. Lindgren.

Mining in the Straits of Magellan

By H. W. Edwards*

Dredges are now working the gold placers. No auriferous veins have been discovered; prospecting in interior hindered by dense undergrowth. A copper mine is being opened at Cutter cove.

*810 South Pennsylvania avenue, Denver, Colo.

It is impossible to write about the territory on the Straits of Magellan without devoting a little space to some of the remarkable history and to some of the prominent natural features which are a source of astonishment to the visitor. Hitherto facts about this region have reached us mostly from reports of sailors who, naturally enough, have confined themselves to observations of use or interest to them in their business.

Climatic Conditions Varied

It is a region of two climates and two totally different landscapes. In the space of a few hours journey one experiences as great a change as passing from, say, California to Nova Scotia in a trip of 25 miles. The west side is a land of almost continuous heavy gales of wind, carrying fog and rain mixed with snow or sometimes with hail. There are not more than 10 days in the year without rain and not more than 25 days a year free from the howling westerly gale. The hilltops are covered with permanent snow and in exposed situations snow, or glaciers, reach down to the sea shore. Nevertheless in the sheltered valleys of this rugged region the vegetation, urged by the drenching rains, is prolific.

Dense Vegetation Troublesome

The rocks in this western half are hornblende schists, syenites and granites with occasional dikes of diorite, for the most part hidden beneath a tangle of water-soaked undergrowth. The valleys are well forested, principally with the antartic beech whose dark, dense foliage lends a somber aspect to the view. Many of these trees are magnificent specimens and the fallen and rotted trunks of past generations prostrate among the dense undergrowth make it extremely difficult and toilsome to travel far from the shore. This range of mountains, among the most picturesque in the world, has for its highest point Mt. Sarmiento, which rises to a hight of 7000 ft. from the very edge of the beach. The whole mass forms a barrier to fierce westerly storms, robs them of their moisture and breaks their force so that the east side is much milder and drier. The geology also is entirely different, being of Tertiary age and forming low rounded hills and extensive treeless prairies with a light rainfall and comparatively bright skies. The aboriginal inhabitants only two decades ago were supposed to number eight or ten thousand, divided into three distinct nationalities. To-day there are only a few hundred all told, and these are mere hangers on around the few mission stations.

Popper's Empire

The first reported discovery of gold in the country is supposed to have been in 1868, in the neighborhood of Cape Virgin at the Atlantic entrance to the Straits of Magellan. The first official titles were not, however, issued until 1881, when Juan M. Frias and Pedro Ponce de Leon, miners from central Chile, denounced and recorded claims on the Tierra del Fuego shore about in the middle of the Straits. Little seems to have been done until the arrival of an Anglo-Austrian Jew, Julius Popper, in 1892. Old timers in the town of Punta Arenas, or Sandy Point, still relate to the visitor of the landing of Julius Popper with a small army of followers, dressed in military uniforms and with all the paraphernalia of a military camp. He proclaimed himself king of Tierra del Fuego and in a short time established his capital at Paramo, in San Sebastian bay, on the east coast, where he at once engaged in the gold-placer industry in a truly royal manner. He issued his own coinage, made of the local gold, in one dollar and five dollar pieces, having for device the crossed pick and shovel surrounded by the word "Popper." He also established a postal service and issued his own postage stamps bearing a similar device to the coins.

There is no record of the gold produced under his rule but it appears to have been sufficient to attract a horde of adventurers and Popper is said to have been driven to the subterfuge of stuffing some of his spare military uniforms with straw and fastening the dummies on horseback so as to appear as if he had at his disposal a considerable body of armed men with which to keep off intruders and poachers on his domain. He extended his search for placer gold all along the shores of Tierra del Fuego, principally toward the south, discovering beach deposits and black sands in various places along the shores, particularly on the shores of the islands of Picton and Navarino and on the main land at Slogget bay. These deposits afterwards yielded considerable gold. At that date there is supposed to have been about 3000 men engaged in placer mining in the country, mostly Austrians, who to-day form a considerable proportion of the inhabitants of the country. Popper was murdered in Buenos Aires in 1904, having been on a visit there for the purpose of purchasing additional machinery for his enterprise at Paramo; his empire thereupon "busted." Its spectacular character during his short reign served to attract attention to the district and to establish the industry.

Shore Deposits First Worked

The "marine deposits," as we may call this class of deposits, was the first crop to which the miners devoted their attention as they were easily reached from boats navigating the sheltered channels and gulfs of the sea; being the accumulations of ages, the finds were at first phenomenal but the harvest was quickly reaped. Thus between December, 1891, and February, 1892, in 26 days' work, 14 Austrians got 3450 oz. of gold from one spot on the shore of Lennox island, and at another place on the same island another party is reported to have gathered 420 oz. in a few hours. The total output from the marine placers during the four years 1891 to 1894 is officially stated to be 1000 kg. equal to, say, 32,000 oz. With the rapid exhaustion of the shore diggings the industry gradually languished until in 1902 it is estimated that only 270 men were following this line of business. A few of the more intelligent miners devoted themselves to the task of searching for the origin of the beach gold and the outcome of their endeavors was the discovery of placer gold in the stream beds.

River Gravel Next Worked

The second period of activity may be said to have commenced in 1902 with the arrival of Archibald Cameron and James Murgrave, both from New Zealand, where they had had experience in dredging. After investigation of the country, they succeeded in organizinng a company to operate on the Santa Maria river, on the Tierra del Fuego side, the stream flowing north into the Straits of Magellan. The dredge, being of the suction type, was found to be but poorly adapted to the work, owing to the number

of rocks and boulders, and the enterprise was a failure. Nevertheless it served to demonstrate the fact that the stream gravels were auriferous.

In the following year a Californian, Sutphen by name, organized a company in Buenos Aires, the "Compañia Sutphen de Lavaderos de Oro." His dredge being landed at Porvenir on the shore of Useless bay, had to be transported, piece by piece, overland to his placer ground on El Oro river, necessitating the construction of 24 miles of road. He installed good workshops, office, dwellings and all the regular equipment necessary. With all this it was 1905 before his dredge was finally afloat. After announcing the successful inauguration of the work and stating that the output was at the rate of 50 oz. of gold per day, the enterprise was suddenly abandoned with no reason publicly assigned. One of the Sutphen employees, J. D. Roberts, an American, remained in the country prospecting on his own account. After traversing a large part of Tierra del Fuego he returned to Punta Arenas and recorded a number of claims. He succeeded in interesting sufficient capital to install two dredges, one quite close to the Sutphen ground and another on the adjoining creek, the Rio Verde. In 1906 there arrived another American, David G. Bricker, whose company put in two steam shovels, but these not proving successful, he put in a dredge on the Loretto claim in 1907. It may therefore be said that the initiation of the new era of gold mining in the Straits of Magellan is due to the three Americans, Sutphen, Roberts and Bricker.

A Boom in 1908

At the end of 1907 or the beginning of 1908, in spite of the obvious failures, a real boom arose in the launching of new companies for dredge mining in that region. Recently there were in operation the following: Lorretto Gold Mining Company, one dredge; Sutphen Gold Washing Company of Tierra del Fuego, two dredges; Rio del Oro Dredging Company, one dredge; Rio Verde Dredging Company, one dredge; Tierra del Fuego Gold Washing Company, one dredge, one steam shovel; Rio Perez Gold Company, one dredge; Rio Progresso Dredge Company, one dredge; Auraphila Gold Company, (on Lennox Island), one dredge. Most of these machines were manufactured by the Conrad company, shipbuilders, Amsterdam, Holland. These enterprises employ all told about 400 men. No official returns are, as yet, available as to the total or individual production. It may be safely estimated as not to exceed 500 to 700 oz. per month, and so some at least of these concerns must be operating at a distinct loss.

No serious attempts have been made to discover any veins in the crystalline rocks which form the western half of the region. It would be a task of extreme difficulty owing to the dense covering of vegetation in the sheltered valleys and to the permanent covering of snow in the exposed parts. Still with ample time and funds there is a chance that veins might be discovered, for, in the town of Punta Arenas are to be seen specimens of auriferous pyrite. These specimens have been passed around from hand to hand until their places of origin are now beyond conjecture.

Copper Mine at Cutter Cove

At Cutter cove about 40 or 50 miles west of Punta Arenas, a copper mine is in active operation. The exposure of ore occurs along the water's edge in the little bay whose name has been adopted by the operating company, the Compañia Minera de Cutter Cove. The local management is in the hands of Ferdinand Dorion, a Frenchman.

In Cutter cove the water is sufficiently deep within 200 yd. of the beach to accommodate the largest ocean steamships. The harbor, as will be noticed on reference to the map, is absolutely safe and secure from all winds. It is situated in the transition zone between the two climates already referred to; at this point it is decidedly wet and stormy but is never cold and out-door work can be carried on all the year round. As usual the surface is hidden beneath a thick tangle of water-soaked vegetation, making prospecting a most difficult and expensive job. The deposit owes its discovery to the fortunate circumstance that it happens to be close to the water and fragments of the vein are visible on the shore. The timber growth here is mostly of a useless variety locally called *coigue*, there being some beech, some oak and a few cypress trees.

The ore is met with over an extensive area, and is extracted from many scattered workings, some of importance and some not. The country rock is a dense, contorted, hornblende schist and the ore is found in quartz veins interlaminated in the schist. The minerals in the quartz which are visible to the naked eye are chalcopyrite, pyrrhotite, pyrite, galena and blende. There is practically no surface oxidized zone. Usually the outcrops are of barren quartz only slightly stained, or the sulphides themselves show on the surface.

The veins have a variable course and dip, following the contortions of the inclosing schist, the general trend being northwest and southeast. No eruptive dikes are visible, but boulders of diorite can be seen in the bed of the Agua Fria creek which runs through the property. The sands of this creek occasionally yield a little gold on panning, although the copper ore contains no traces. The veins will sometimes carry a width of 20 feet, but are variable, narrowing and

Map Showing Known Mineral Deposits in Magellan Straits

disappearing suddenly to be again encountered between other folds of the schist.

Fuel and Navigation Facilities

The earliest working, now known as the Vives, is a tunnel commencing close to the water. Both sides of the drift are in schist and the ore occurs in an irregular manner, much of the drift being barren. On the whole the prospect is far from attractive and is a poor introduction to the property. Inland southeast from this drift is the Alejandro shaft, in the north drift of which a quantity of shipping ore was obtained, the vein being 6 to 10 ft. wide and assaying for the full width 3½ per cent. copper.

About 1½ miles from the Vives, toward the southwest is the Samuel, the principal working of which is a large open cut which yields about 4000 tons of ore annually averaging 3½ per cent. Between the Vives and the Samuel the road passes over, or near, several workings or outcrops all of the same general description, and for still another mile the same conditions repeat themselves. The characteristic of the district is the large number of these quartz lenses and stringers of all sizes and the future of the mine depends on prospecting far ahead of immediate needs and yet not over-spending money in this direction—a rather delicate situation. They have the advantage of cheap fuel at their doors in the local lignites, which, although not possessing more than 60 per cent. of the calorific power of good coal, yet give a long hot flame quite suitable for steam purposes and for reverberatory furnaces. This advantage coupled with having ocean navigation available and all supplies purchasable at an astonishingly cheap rate due to the low cost of ocean transportation from Europe or Buenos Aires, assist in overcoming some of the drawbacks.

Antiquated Concentrator

Their concentration mill, though recent, is not modern, consisting merely of a crusher, a ball mill and a few Luhrig bumping vanners. The general deliveries to the mill do not average over 2¼ per cent. copper. The concentrates produced assay usually about 14 per cent. copper with two or three ounces of silver per ton and a trace of gold. The capacity of the mill is 65 tons of ore per day. It is connected with the mines by a narrow-gage track about three miles long.

This whole enterprise is merely in the prospect stage as yet and, should it succeed in making a living, it will stimulate the search for other deposits and will encourage the investment of capital in some of the already known deposits, of which there are about a dozen authenticated, extending down to the southern shore of the island of Tierra del Fuego, in fact one other company is already organized to start work near Ushuaia. Taking the district on the whole it may be summed up that although exceedingly interesting it is not now a field for profitable investment and will not be until additional discoveries are made.

Battery Truck Crane

A device for handling freight and materials which have to be lifted and moved through moderate distances, is now being placed on the market by the General Electric Company, Schenectady, New York. It is known as the battery truck crane, an electric vehicle which has a swinging crane mounted on the front end. The crane's hook is raised and lowered by a one-ton hoist mounted on the front end just back of the crane; the motors driving the hoist and the vehicle are operated from a battery mounted on the rear end.

Battery Truck Crane Unloading Gondola Car

The applications of this crane may be classed under three heads, hoisting, hoisting and carrying on the hook, and towing trailers, yet a given movement of material may involve one, two or all of these.

The battery truck crane may be employed to load or unload box cars, gondola cars, wagons, etc., permitting the material to be moved through a vertical distance of 10 ft. and to be placed anywhere within an 8-ft. radius.

When material, in small or large quantities, has to be moved less than 400 ft. or, in small quantities, to any distance, the article is lifted by the hook and conveyed to its destination by the vehicle. The short wheel base permits making short turns so this machine may readily be driven about shop aisles, congested piers, or among the piles of material in a storage yard. The flexibility of operation, simplicity and speed of this machine adapt it to heavy errand work about mines and smelteries, even when they are fully equipped with cranes and industrial railway. Derailed cars and spilled loads on the industrial railway are quickly replaced and the line cleared by the battery truck crane.

The battery truck crane is designed for a high draw-bar pull, its maximum being a pull of 2000 lb. and equal to that of a 5-ton locomotive on rails and sufficient to spot a car and to handle readily loads of from 5 to 8 tons on trailers, if desired. The hight of the crane is made to suit local conditions, or several booms of different lengths are supplied. The battery truck crane has all the advantages of an electrically operated vehicle. The simplicity of operating mechanism eliminates the need of experts, as a man of ordinary intelligence can become fairly proficient in operation in a day and expert in a few weeks. The battery charging may be left to a night watchman. Where direct current is available, a simple panel and rheostat serve for the charging apparatus, while, if alternating current is used, a rectifier panel will transform the current to direct current for charging.

The Lead Smeltery at Tooele

Salt Lake Correspondence

Progress is being made by the International company in the construction of its new lead smeltery at Tooele. The work was held back, awaiting a decision as to the sintering process to be employed. The Dwight-Lloyd process was chosen and orders for the sintering plant were placed immediately. According to word received from the East, this will be on hand when wanted. The structural steel is arriving and the work of putting it up is progressing. Practically all the surface excavation and foundation work was completed before the cold weather set in. Foundations for two of the three lead furnaces have been finished and work of erecting the furnaces will be started soon. The third furnace will not be built at present. The railroad tracks to the lead furnaces are completed and the ore bins are well under way. About 90 per cent. of the steel for the storage and bedding bins has been received, and the large flue and dust catchers have been completed. The power house has been enlarged for the requirements of the lead furnaces and the additional engines and blowers are being placed on the foundations. Work on the new lead plant was started in June and from present indications two of the furnaces should be operating early in 1912. The capacity will be 500 tons of lead ore per day and contracts are understood to have been signed for this amount. Lead ores are being received and stockpiled, awaiting the completion of the plant.

The Ray Consolidated Power Plant

By C. A. Tupper*

The new power plant of the Ray Consolidated Copper Company, at Hayden, Ariz., contains four horizontal four-cylinder triple-expansion engines, the largest of their type ever constructed.

*Consulting engineer, 389 Thirty-first avenue, Milwaukee, Wis.

Much attention has been attracted by the new steam power plant of the Ray Consolidated Copper Company at Hayden, Ariz., which supplies power for operating the mines at Ray and the concentrating plant at Hayden.

The four engines installed at this power plant are the largest of the type ever constructed. These are horizontal four-cylinder triple-expansion Corliss engines, with 28-in. high-pressure, 52-in. intermediate and two 54-in. low-pressure cylinders, all having a common stroke of 48 in. The low-pressure cylinders are bolted directly to the frames, and the high and intermediate cylinders are placed tandem to the low-pressure cylinders. The distance pieces between the low-pressure and the high- and intermediate-pressure cylinders are of heavy construction and are split horizontally so that, by taking out the tap bolts holding the distance pieces to the cylinders, these parts can be removed, the intermediate crosshead taken out, the low-pressure cylinder head removed and the low-pressure piston taken out. The tail guides, after being properly lined up, are doweled in place so that they can be removed when necessary to open the cylinders and can be accurately put back by replacing the taper dowel pins in their respective holes.

The piston rods on these engines are made unusually large and rigid so that they practically carry the weight of the pistons. This method of construction is the same as that employed in gas-engine practice successfully. Both the cylinders and frames are of entirely new design, and the frame and guides are made in one casting with a lip cast around the base to catch any oil which may run down the sides. One of the striking features of the frame is the massive jaw which retains the shells carrying the shaft. The bottom shell is made circular in form so that it will aline with the shaft under all conditions.

The quarterboxes are adjustable with wedges, both fore and aft, adjusting bolts being brought up through the top of the cap and so arranged that the quarterboxes can be taken up while the engine is running at full speed.

The crosshead guide and crank are entirely inclosed with steel oil guards and the front is provided with wire-screen doors, which prevent the oil being thrown out and at the same time allow air to enter for circulation and to assist in keeping the pins cool.

The full-load rating of each engine is 2650 h.p. when receiving steam at 175-lb. gage and 50- to 75-deg. superheat; but they are designed to handle heavy

GENERAL VIEW IN THE RAY CONSOLIDATED POWER HOUSE

overloads, as shown by the fact that for over three months after installation the first two engines ran noncondensing and the load frequently swung to 2500 kw. Although the normal rating of the generator is 1750 kw. with 80 per cent. power factor, the engine carried this load with only 150-lb. steam pressure, which was a remarkable performance for triple-expansion engine running noncondensing.

The flywheels are 26 ft. in diameter, weigh 55 tons each and are made from steel castings on account of the high rim speed corresponding to 100 revolutions per minute.

Each engine drives a three-phase, 60-cycle, 6600-volt generator excited at 120 volts from a 60-kw. direct-current engine-driven generator. These units, complete, were built and installed by the Allis-Chalmers Company.

Steam Generation

Steam is supplied by 14 Heine boilers of 513 h.p. each, equipped with Foster superheaters. The feed water is delivered by four compound Blake pumps, through three Foster feed-water heaters. The hot water from the condensing system is pumped to three cooling towers, constructed on what is known as the "Ray Consolidated system," and thence returned to an 8,000,000-gal. reservoir which feeds both the power plant and the mill. All of the water circulated is handled by a Nordberg triple-expansion pumping engine of 10,000,000 gal. capacity per 24 hours. The original source of supply is the Gila river, where three motor-driven pumps are installed.

Current from the generators is supplied to motors operating machinery in the mill, repair shops, etc., and is also transmitted at 45,000 volts to the company's mines at Ray, 20 miles distant.

Virginia Mineral Output

The report of the Virginia Geological Survey gives the total value of the mineral production of the State in 1910 as

PRODUCTION OF PRINCIPAL MINERALS OF VIRGINIA IN 1910

Coal, tons	6,507,997
Coke, tons	1,493,665
Iron ores, long tons	903,377
Iron, pig, long tons	444,976
Lime, tons	141,257
Manganese ore, long tons	1,758
Pyrites, long tons	140,106
Sand and gravel, tons	764,321
Slate, squares	31,787
Talc and soapstone, tons	25,908
Zinc (spelter) lb.	1,588,112

$22,755,161, an increase of $2,919,491 over 1909. The production of the principal minerals in 1910 is shown in the accompanying table.

Grecian Mineral Production for 1910

The principal mineral products of Greece for 1910 are reported as follows, the items being given in order of their value: Work lead, 16,573 tons and 185,207 tons of lead ore; sea salt, 20,055; calcined zinc ore, 27,567, besides 37,108 tons of crude ore; calcined magnesite, 19,294; crude magnesite, 48,913; emery, 8000 tons; marble, 2851 cu.m.; manganese iron ore, 35,594 tons; chrome ore, 7000; pyrites, 27,557 tons.

Cyanide Mills in Sonora

Our correspondent has furnished us with the following list of cyanide plants in Sonora, Mexico:

Zambona Mining Company, A. J. Yeager, manager, Minas Nuevas, Alamos district; steam power, 20 stamps, 2 tube mills, 1 Hardinge mill, 4 Wilfley tables, 2 Dorr classifiers, 2 Dorr thickeners, 3 Pachuca tanks; 100 tons capacity.

Wilson & Obermüller, Sobia, Alamos district. Postoffice, Alamos. Thirty-ton cyanide plant, treating tailings from La Junta Mining Company's 10-stamp mill. Wilson & Obermüller have also a five-stamp mill at the same place, using amalgamation process.

Mesa Rica Mining Company, F. A. Tanner, president and general manager, Sahuaripa, Sonora; 10-stamp mill, Imlay process of cyanidation; 40 tons capacity. Recently started.

Durazno-Tetamos Mining Company, H. G. Parsons, general manager, Alamos; 30 tons capacity.

Golfo del Oro Mining Company, Rio Chico, Sonora; 10 stamps, 25 tons capacity.

Quintera Mining Company, care of T. Robinson-Bours y Hermanos, Alamos; 25-ton plant at Aduana, Alamos district; idle.

Arizona-Sonora Gold Mining and Development Company, Cucurpe, Sonora; home office, Bisbee, Ariz.; 45 tons.

Black Mountain Gold Mining Company, Cerro Prieto, Sonora; home office, Chicago; 120 stamps, 375 tons capacity; idle.

Creston-Colorada Mining Company; postoffice, Torres, Sonora; 200 tons capacity.

Globe Mining and Milling Company, Nacozari, Sonora; 50 tons.

Veta Grande Mining Company, Altar, Sonora; capacity, 20 stamps; probably idle.

Red Mountain Mining Company, Santa Ana, Sonora; capacity, 200 tons; can find no late mention of this company; presume it is idle, or possibly has changed name.

Mina Grande Mining Company, San Antonia de la Huerta; capacity, 15 tons.

Dos Cabezas Mining Company, Monroe Harper, manager. Dos Cabezas, Sonora; 50 tons capacity.

Juarez Mining Company, Caborca, Altar district, Sonora; capacity, 25 tons.

Quaker City Mining Company, S. A., El Cajon, Altar district, Sonora.

Batalera Mining Company, Oquitoa, Altar district, Sonora; small plant; probably idle.

Plomo Mining Company, Cerro Colorado, Altar district; capacity, 60 tons.

Descubridora de Quitovaca Mining Company, S. A., Quitovaco, Altar district, Sonora; capacity, 30 tons; probably idle.

Reina del Oro Mining Company, El Tiro, Altar district, Sonora; capacity, 30 tons; probably idle.

Sierra Pinta Mining Company, Sierra Pinta, Coborca, Altar district, Sonora; probably idle.

Sombretillo Mining Company, S. A., Sombretillo, Sáric, Altar district; Sonora; capacity, 20 tons; probably idle.

Tajitos Mining Company, S. A., Los Tajitos, Coborca, Altar district, Sonora; capacity, 15 tons.

Sonora Quartz Mines Development Company, El Tiro, Altar district, Sonora; capacity, 15 tons.

Banco de Oro Mining Company, Cerro Prieto, Magdalena district, Sonora; capacity, 25 tons.

Iron Ore in Virginia

The present commercial deposits of iron ore in Virginia are confined to the Piedmont and Appalachian regions. The ores of the Piedmont district occur in metamorphic crystalline rocks, probably of Pre-cambrian age, while those of the Appalachian region occur in sedimentary rocks of Paleozoic age, or the residual material derived from them. The principal ores are limonite, red hematite and magnetite.

The sulphides and carbonate occur in many places but as yet do not form an important source of the metal. In recent years, the magnetite ore at Pittsville, Pittsylvania county, has been the most extensively mined in the Piedmont region, which as a whole contributes only a minor part of the total production of the State.

The brown ores of the Appalachian region, which include the "mountain," valley or limestone, and Oriskany ores, are commercially the most important ones in Virginia, and of these the Oriskany ores lead. The district from which they are mined includes the counties of Alleghany, Botetourt and Craig, from which nearly all the ore of this type is produced. The ores are limited to a definite horizon, representing replacements of the upper portion of the Lewistown limestone and lying immediately below the Monterey sandstone.

The Oriskany iron-ore deposits are continuous for considerable distances along the strike, with great variations in thickness, ranging up to 75 ft. and averaging about 15 to 25 ft. The ore is apt to be porous and runs from 35 to 50 per cent. metallic iron, being usually high in silica and manganese. According to the Virginia Geological Survey, the production of brown hematite amounted to 821,131 tons in 1910 and constituted 90.89 per cent. of the total iron-ore production of the State.

The Mining Index

This index is a convenient reference to the current literature of mining and metallurgy published in all of the important periodicals of the world. We will furnish a copy of any article (if in print), in the original language, for the price quoted. Where no price is quoted, the cost is unknown. Inasmuch as the papers must be ordered from the publishers, there will be some delay for foreign papers. Remittance must be sent with order. Coupons are furnished at the following prices: 20c. each, six for $1, 33 for $5, and 100 for $15. When remittances are made in even dollars, we will return the excess over an order in coupons, if so requested.

A Classified Bibliography of the Current Literature of Mining and Metallurgy

COAL

17,122—ALASKA—The Bering River Coal Field, Alaska. George F. Kay. (Popular Science Monthly, Nov., 1911; 14 pp., illus.) 40c.

17,123—ALASKA COAL QUESTION, The. (Eng. and Min. Journ., Nov. 11, 1911; 1 p.) Extracts from address of Secretary Fisher before Am. Min. Congress, Oct. 27, 1911. 20c.

17,124—ALBERTA—Bighorn Coal Basin, Alberta. G. S. Malloch. (Can. Dept. of Mines, Mem oir 9-E, 1911; 66 pp., illus.)

17,125—ANALYSIS—A Plea for Revision of the Rules of the American Chemical Society Governing the Proximate Analysis of Coal. Marius R. Campbell. (Econ. Geol., Sept., 1911; 6 pp.) 60c.

17,126—ARKANSAS—Coal Mining in Arkansas. (Mines and Minerals, Nov., 1911; 2¾ pp., illus.) 40c.

17,127—BAVARIA—Ueber die Genesis des Stockheimer Steinkohlenflözes. P. Krusch. (Glückauf, Oct. 14, 1911; 6½ pp., illus.) On the genesis of the Stockheim coal bed. 40c.

17,128—COAL CUTTER—Die Versuchsergebnisse mit der Pressluft- "Pick-Quick"-Grossschrämmaschine auf der Grube Viktoria des Königlichen Steinkohlenbergwerks Gerhard zu Louisenthal (Saar). Weise. (Preuss. Zeit. f. B., H. u. S., Vol. 59, Part 3, 1911; 8½ pp., illus.) Results of experiments made with the "Pick-Quick" compressed-air coal cutter at Victoria colliery of the Gerhard zu Louisenthal concession.

17,129—COAL CUTTING—Modern English Coal Cutters, Punchers and Drills. Frank C. Perkins. (Min. and Eng. Wld., Oct. 21, 1911; 2¼ pp., illus.) 20c.

17,130—COAL DUST—Die Abtrocknung des Kohlenstaubes unter der Einwirkung der Grubenwetter. Hatzfeld. (Preuss. Zeit. f. B., H. u. S., Vol. 59, Part 3, 1911; 24½ pp., illus.) The desiccation of coal dust under the influence of mine ventilation.

17,131—COAL DUST—Heutiger Stand der Untersuchungen über die Kohlenstaubgefahr. (Bergbau, Oct. 5, 1911; 1¼ pp.) Present status of the investigations on the coal-dust danger. Abstract from H. Schmerber, "La sécurité dans les mines."

17,132—COAL-DUST EXPLOSIONS. Jas. Ashworth. (Mines and Minerals, Nov., 1911; 1¼ pp., illus.) The influence of compression, percussion and detonation in causing and transmitting explosions. 40c.

17,133—COKE—Development of a By-Product Coke-Oven Gas Plant. Warren S. Blauvelt. (Progressive Age, Nov. 15, 1911; 2¼ pp., illus.) 40c.

17,134—COKE—Die Kokereien des Königlichen Steinkohlenbergwerks Heinitz. Fähndrich. (Preuss. Zeit. f. B., H. u. S., Vol. 59, Part 3, 1911; 30 pp., illus.) The cokeries of the Royal Heinitz colliery, Saarbrücken.

17,135—COKE—Kritische Streifzüge durch das technische Gebiet der Koksofenindustrie. C. Still. (Glückauf, Sept. 30, Oct. 7 and 14, 1911; 25¾ pp., illus.) $1.

17,136—COKE—Mechanical Devices for Quenching and Loading Coke. A. Thau. (Iron and Coal Tr. Rev., Nov. 10, 1911; 3 pp., illus.) Translated from Glückauf. 40c.

17,137—COKE—Waste-Heat Coke Ovens. (Mines and Minerals, Oct., 1911; 2½ pp., illus.) 40c.

17,138—COLORADO—The Puritan Mine. Joseph Watson. (Mines and Minerals, Oct., 1911; 1½ pp., illus.) Some interesting features in the equipment of one of the newer Colorado coal mines. 40c.

17,139—CONVEYING—Some Experiences with the Pitot Tube on High and Low Air Velocities. Frank H. Kneeland. (Journ. A. S. M. E., Nov., 1911; 30 pp., illus.) Describes tests made at plants of U. S. Coal and Coke Co., Gary, W. Va., in connection with the flow of air through an experimental pipe line erected to study the conveying of coal by an air blast.

17,140—EXPLOSION in O'Gara Mine No. 4 at Harrisburg, Ill. Floyd W. Parsons. (Coal Age, Nov. 4, 1911; 1¼ pp., illus.) 20c.

17,141—EXPLOSION TEST at Bruceton Mine. J. T. Beard. (Coal Age, Nov. 4, 1911; 2¾ pp., illus.) 20c.

17,142—EXPLOSIVES—Emploi des Explosifs en 1910 dans les Mines de Houilles de Belgique. V. Watteyne and Ad. Breyre. (Ministère de l'Industrie et du Travail, Bruxelles, Belgium, 1911; 45 pp., illus.)

17,143—FLUSHING—Der Spülversatz auf den staatlichen Steinkohlenbergwerken bei Saarbrücken. Volmer. (Preuss. Zeit. f. B., H. u. S., Vol. 59, Part 3, 1911; 38 pp., illus.) The flushing system at the fiscal collieries near Saarbrücken.

17,144—GAS—Der Kohlensäureausbruch auf dem Steinkohlenbergwerk Cons. Seegen Gottes-Grube bei Altwasser am 7 December, 1910. Laske. (Preuss. Zeit. f. B., H. u. S., Vol. 59, Part 2; 12 pp., illus. Outbreak of carbon dioxide at Cons. Seegen Gottes colliery, near Altwasser, Lower Silesia.

17,145—GEOLOGY—Importance of Geology in Coal Mining. I. C. White. (Coal Age, Oct. 14, 1911; 1 p., illus.) 20c.

17,146—GERMANY—Die Kohlenführung und Grösse des staatlichen Saarbrücker Berechtigungsfelds. Schlicker. (Preuss. Zeit. f. B., H. u. S., Vol. 59, Part 3, 1911; 20½ pp., illus.) The amount of coal in and the size of the fiscal Saarbrücken coalfield.

17,147—HAULAGE—Abbaufördereinrichtungen auf den staatlichen Steinkohlenbergwerken bei Saarbrücken. K. Hochstrate. (Preuss. Zeit. f. B., H. u. S., Vol. 59, Part 3, 1911; 19 pp., illus.) Underground hauling arrangements at the fiscal collieries near Saarbrücken.

17,148—INDIA—Coal in the Namchik Valley, Upper Assam. E. H. Pascoe. (Rec., Geol. Surv. of India, Vol. XLI, Part 3, 1911; 3 pp.)

17,149—IOWA—The Cost of Mining Coal in Iowa. Edward A. Sayre. (Mines and Minerals, Nov., 1911; 1½ pp.) 40c.

17,150—LOW-GRADE FUEL—Ausnutzung minderwertiger Brennstoffe auf Zechen des Oberbergamtsbezirks Dortmund. XI. Bütow and Dobbelstein. (Glückauf, Sept. 30, 1911; 2 pp.) Utilization of low-grade fuel at collieries of the Dortmund mining division. 40c.

17,151—MARYLAND—Georges Creek Coalfield, Maryland. R. Dawson Hall. (Coal Age, Oct. 14, 1911; 4⅓ pp., illus.) 20c.

17,152—MICHIGAN—Coal Mining in Michigan. (Mines and Minerals, Oct., 1911; 3½ pp., illus.) 40c.

17,153—MINING METHOD—The Working of the Thick Coal Seams in Upper Silesia. (Iron and Coal Tr. Rev., Oct. 20, 1911; 1⅔ pp., illus.) Paper before North of England Inst. of Min. and Mechan. Engrs. 40c.

17,154—MINING METHODS—Anthracite and Bituminous Mining. Eli T. Conner. (Coal Age, Oct. 14 and 21, 1911; 8 pp., illus.) 20c.

17,155—PEAT—The Production and Use of Peat Fuel. (Journ. Am. Peat Soc., Apr., 1911; 11½ pp.)

17,156—PENNSYLVANIA—Report of the Department of Mines of Pennsylvania, 1910. Part II. Bituminous. (James E. Roderick, Chief of Dept. of Mines, Harrisburg, Penn.; 77 pp., illus.)

17,157—PLANT—Universal Mine Plant and Shafts of the Bunsen Coal Company. A. F. Allard. (Mines and Minerals, Oct., 1911; 8½ pp., illus.) 40c.

17,158—PREPARATION of Anthracite. Paul Sterling. (Bull. A. I. M. E., Oct., 1911; 50 pp., illus.)

17,159—PRICES—Government Regulation of Coal Prices. John H. Jones. (Coal Age, Oct. 14, 1911; 1⅔ pp., illus.) 20c.

17,160—PROSPECTING—Progress in Coal Prospecting. J. A. Wentz. (Can. Min. Journ., Oct. 15, 1911; 3 pp., illus.) 20c.

17,161—RESCUE APPARATUS—Liquid-Air Rescue Apparatus at the Makiewka (Donetz) Rescue Station. D. Lewitsky. (Colliery Guardian, Oct. 6, 1911; 1¼ pp., illus.) 40c.

17,162—SCOTLAND—Bedlay and Bothwell Park Collieries. (Iron and Coal Tr. Rev., Oct. 20, 1911; 3⅔ pp., illus.) 40c.

17,163—SHAFTS—Concrete-Lined Coal Mine Shafts of Annabelle Mine, Annabelle, W. Va. E. C. Auld. (Eng. News, Oct. 26, 1911; 3 pp., illus.) 20c.

17,164—STORAGE—Under-Water Coal Storage; Submerged 10,000-Ton Coal-Storage Pit at Omaha. (Elec. Wld., Oct. 7, 1911; 1¼ pp., illus.) 20c.

17,165—SURVEYING as Applied to Coal Mining. William Pirie. (Iron and Coal Tr. Rev., Nov. 3, 1911; 2 pp., illus.) 40c.

17,166—TENNESSEE—Coal Field of Tennessee. George H. Ashley. (Resources of Tenn., Nov., 1911; 15 pp., illus.)

17,167—TIMBERING—Safety through Systematic Timbering. Stephen L. Goodale. (Mines and Minerals, Nov., 1911; 5¼ pp., illus.) Method of mining used by the H. C. Frick Coke Company that results in safety and economy. 40c.

17,168—TRANSVAAL—The Testing of Transvaal Coals. M. Thornton Murray. (Journ. Chem., Met. and Min. Soc. of South Africa, Sept., 1911; 3¾ pp.) Discussion on paper previously indexed. 60c.

17,169—UTAH—The Castle Valley Coal Company. Benedict Shubart. (Coal Age, Oct. 21, 1911; 3 pp., illus.) 20c.

17,170—VENTILATION—High Humidity for Mine Ventilation. Frank Haas. (Coal Age, Oct. 14, 1911; 1⅔ pp.) 20c.

17,171—WASHING and Sorting of Small Coal. N. T. Williams. (Cassier's Mag., Nov., 1911; 23 pp., illus.) 40c.

17,172—WEST VIRGINIA—The Fairmont, W. Va., Coal Region. R. Dawson Hall. (Coal Age, Nov. 11, 1911; 5 pp., illus.) 20c.

COPPER

17,174—CHILE—The Mineral Region of Collahuasi. Manuel C. Gonzales. (Eng. and Min. Journ., Nov. 11, 1911; 1½ pp., illus.) 20c.

17,175—ELECTRIC SMELTING—Das elektrische Verschmelzen von Kupfererzen und Zwischenerzeugnissen der Kupferhütten. J. Schilowski. (Metallurgie, Oct. 8, 1911; 7½ pp., illus.) The electric smelting of sulphide copper ore rich in arsenic. 60c.

17,176—JAPAN—The Ashio Copper Mine. Thomas T. Read. (Min. and Sci. Press, Oct. 14, 1911; 5 pp., illus.) 20c.

17,177—LEACHING Applied to Copper Ore. W. L. Austin. (Mines and Methods, Oct., 1911; 3⅔ pp., illus.) Eleventh article, reviewing results accomplished, with further reference to utilization of waste furnace gases. 20c.

17,178—LEACHING COPPER SULPHIDE ORES IN PLACE. H. T. Durant. (Eng. and Min. Journ., Nov. 11, 1911; ⅔ p.) 20c.

17,179—SMELTING—La Consommation de Combustible dans la Fusion des Minerais de Cuivre et Plomb. Georges Raill. (Rev. Univ. des Mines, June, 1911; 84 pp., illus.)

17,180—SPAIN—Der Kupferbergbau auf der Pyrenäenhalbinsel. Fleck. (Bergbau, Oct. 19 and 26, 1911; 3¾ pp.) Copper mining on the Iberian peninsula. 20c.

GOLD AND SILVER

17,181—AMALGAMATION—The Area of Amalgamation Plates. Clarence C. Semple. (Eng. and Min. Journ., Oct. 28, 1911; ¾ p.) 20c.

17,182—ANALYSIS OF ALLOYS—A Method of Analyzing Some Commercial Gold Alloys. Metals Present: Gold, Silver, Copper and Occasionally Zinc and Tin. James O. Handy. (Journ. Ind. and Eng. Chem., Nov., 1911; ¾ p.) 80c.

17,183—ARIZONA—Operations at Mammoth Mine, Goldfields, Arizona. Chas. A. Dinsmore. (Min. and Eng. Wld., Oct. 7, 1911; 2 pp., illus.) 20c.

17,184—CALIFORNIA—Deep Mining for Gold in the Kennedy Mine on the California Mother Lode. A. H. Martin. (Min. Sci., Sept. 7, 1911; 1½ pp.) 20c.

17,185—CALIFORNIA—Mining on the Mother Lode of California. William H.

Storms. (Min. and Eng. Wld., Oct. 28, 1911; 3 pp., illus.) 20c.

17,186—CHOSEN — Oriental Consolidated Mining Company. (Eng. and Min. Journ., Nov. 4, 1911; 3 pp., illus.) Abstract of annual report. 20c.

17,187—COLORADO—Geology, Mines and Ore Deposits of Breckenridge. Arthur Lakes, Sr. (Min. Sci., Oct. 26 and Nov. 2, 1911; 4¼ pp., illus.) 40c.

17,188—COSTS—Mining Costs at Goldfield, Nevada. Claude T. Rice. (Eng. and Min. Journ., Nov. 18, 1911; ¾ p.) 20c.

17,189—CRUSHING—Chilean Milling in Peru. B. L. Sackett. (Eng. and Min. Journ., Nov. 11, 1911; 2⅓ pp., illus.) 20c.

17,190 — CYANIDING — Experiments in Slime Filtration. George J. Young. (Eng. and Min. Journ., Nov. 4, 1911; 3¾ pp.) Abstract of a paper before Am. Inst. of Min. Engrs., Oct., 1911. 20c.

17,191—CYANIDING—Handling Old Tailing for Cyanidation. J. B. Harper. (Min. Sci., Nov. 9, 1911; 1½ pp., illus.) 20c.

17,192—CYANIDING—Losses in Cyanidation. H. Forbes Julian. (Min. Mag., Oct., 1911; 6¾ pp., illus.) 40c.

17,193—CYANIDING—Mexican Practice as Applied to the Cyanidation of Colorado Ores. Marshall D. Draper. (Colo. School of Mines Mag., Nov., 1911; 3¾ pp.)

17,194—CYANIDING—Note on the Use of Certain Cyanicides in the Estimation of Undissolved Gold. (Journ. Chem., Met. and Min. Soc. of South Africa, Sept., 1911; 1 p.) 60c.

17,195 — CYANIDING — Precipitation of Gold and Silver in Cyaniding. H. A. Megraw. (Min. and Eng. Wld., Oct. 7, 1911; 2⅓ pp., illus.) 20c.

17,196—CYANIDING—Review of the Various Slime Filter Types. B. H. Moore. (Min. and Eng. Wld., Oct. 7, 1911; 1⅓ pp.) 20c.

17,197—CYANIDING—The Assay of Gold-Bearing Cyanide Solutions by Electrolysis. C. Crichton. (Journ. Chem., Met. and Min. Soc. of South Africa, Sept., 1911; 2 pp.) 60c.

17,198—CYANIDING—The Burt Revolving Filter. (Mines and Minerals, Nov., 1911; 1½ pp., illus.) 20c.

17,199—CYANIDING—The Colburn Mill and the Clancy Process. A. W. Warwick. (Min. Sci., Nov. 9, 1911; 2½ pp., illus.) Description of first plant to use the cyanamide method of treating tellurium ores at Cripple Creek. 20c.

17,200—DREDGE—An Australian Pump-Dredge. Charles Janin. (Min. and Sci. Press, Nov. 11, 1911; 1½ pp., illus.) 20c.

17,201—DREDGE — Latest Gold Dredge Built in the Oroville Field. George L. Hurst. (Min. and Eng. Wld., Oct. 21, 1911; 1 p., illus.) 20c.

17,202—DREDGES—Giant Gold Dredges at Natoma, California. Newton Cleaveland. (Min. and Sci. Press, Oct. 7, 1911; 2½ pp., illus.) 20c.

17,203 — DREDGING — Examination of Dredging Properties. Francis J. Dennin. (Min. and Sci. Press, Oct. 14, 1911; 1 p.) 20c.

17,204—DREDGING—Gold Dredging with Steam Shovel, near Dillon, Colo. Arthur Lakes, Sr. (Min. Sci., Nov. 9, 1911; 2 pp., illus.) 20c.

17,205 — DREDGING — Present-Day Problems in California Gold Dredging. Charles Janin. (Min. and Sci. Press, Oct. 14, 1911; 4 pp., illus.) 20c.

17,206 — DREDGING — The Yuba River Dredging Field in California. A. H. Martin. (Min. and Eng. Wld., Sept. 2, 1911; 1⅞ pp., illus.) 20c.

17,207—GUANAJUATO—Some Historical Notes on the Guanajuato District. Herbert A. Megraw. (Min. and Eng. Wld., Sept. 16, 1911; 3 pp., illus.) 20c.

17,208—HONDURAS—The Future of the Honduras Mining Industry. Paul Wooton. (Min. and Eng. Wld., Oct. 14, 1911; 1⅓ pp.) 20c.

17,209—MEXICO—The Influence of Smelting, Electricity and the Cyanide Process on Mexican Silver Mining. Victor M. Braschi. (Informes y Memorias, Instituto Mexicano de Minas y Metalurgia, Vol. II, No. 4; 5 pp.) 40c.

17,210—MILL—The Electrification of a Gold Reduction Mill. (Elec. Wld., Sept. 16, 1911; 1½ pp.) 20c.

17,211—MILL—The Nevada Hill Mill, Wonder, Nev. (Salt Lake Min. Rev., Oct. 30, 1911; 3 pp., illus.) 20c.

17,212—MILL—The Nevada Wonder Mining Company's New Mill. P. E. Van Saun. (Min. and Eng. Wld., Nov. 11, 1911; 3⅔ pp., illus.) 20c.

17,213—MILLING—Gold Milling in California. William H. Storms. (Met. and Chem. Eng., Oct., 1911; 2½ pp.) 40c.

17,214—NEVADA—The Ploche, Nevada, District. R. N. Bell. (Mines and Minerals, Oct., 1911; 2½ pp., illus.) 40c.

17,215—NOVA SCOTIA—Research Work on Certain Nova Scotian Gold Ores. Ora Willis Knight. (Can. Min. Journ., Oct. 1 and 15, 1911; 11 pp., illus.) Abstract of paper before Min. Soc. of Nova Scotia. 40c.

17,216—ONTARIO—Gold Fields of Lake of the Woods, Manitou and Dryden. Arthur L. Dryden. (Report, Ont. Bureau of Mines, Vol. XX, Part 1, 1911; 41 pp., illus.)

17,217 — ORE DRESSING — Recent Ore Dressing Practice at Silverton, Colo. (Met. and Chem. Eng., Oct., 1911; 2 pp.) 40c.

17,218—PLACERS—Gold Placers in Bolivia. Miltiades Armas. (Eng. and Min. Journ., Oct. 28, 1911; 3 pp., illus.) 20c.

17,219—PORCUPINE—A Suggestion about the Treatment of Porcupine Ores. Phil H. Moore. (Can. Min. Journ., Sept. 1, 1911; 1⅓ pp., illus.) 20c.

17,220—PORCUPINE—The Vipond Mine of the Porcupine Gold Mines Company. H. P. Davis. (Can. Min. Journ., Nov. 1, 1911; 2¼ pp., illus.) 20c.

17,221—RAND—Geology of the Witwatersrand and Its Extensions. Rowland Gascoyne. (Min. Wld., June 24, 1911; 2⅓ pp.) Continuation of article previously indexed. 20c.

17,222—REDUCTION PLANT—East Rand Proprietary Reduction Plant. (Min. and Eng. Wld., Oct. 21, 1911; 1 p., illus.) 20c.

17,223—SAMPLING of High-Grade Cobalt Silver Ores. (Can. Min. Journ., Oct. 13, 1911; 2½ pp., illus.) 20c.

17,224—SAMPLING—Ore-Shipment Sampling in Cobalt. (Can. Min. Journ., Oct. 1, 1911; 4½ pp., illus.) 20c.

17,225—SOUTH AFRICA—Description of Plant and Equipment of Brakpan Mines, Ltd. (Journ. South African Inst. of Engrs., Oct., 1911; 13 pp., illus.) 60c.

17,226—STAMP MILLING—Oil Engine for Driving Gravity Stamps. James A. Seager. (Eng. and Min. Journ., Oct. 28, 1911; 1¼ pp., illus.) 20c.

17,227 — STAMP MILLING — Wear of Screens in Single Stamp Mills. Algernon Del Mar. (Eng. and Min. Journ., Oct. 28, 1911; ⅔ p.) 20c.

17,228—STAMP MILLS—Cost of Constructing Stamp Mills. Charles T. Hutchinson. (Min. and Sci. Press, Oct. 28, 1911; 4½ pp.) 20c.

17,229 — TRANSVAAL'S FUTURE AND PRESENT-DAY PRODUCTION. Rowland Gascoyne. (Min. and Eng. Wld., Nov. 11, 1911; 1⅓ pp.) 20c.

IRON AND STEEL

17,230 — ALLOYS — The Mechanical Influence on Carbon Alloys of Iron and Manganese. J. O. Arnold and F. K. Knowles. (Iron and Steel Inst., Oct., 1911, advance sheets; 9 pp., illus.)

17,231—BRIQUETTING—Iron-Ore Treatment Plant of the Alquife Mines and Railway Company of Spain. (Mines and Minerals, Nov., 1911; 1¾ pp., illus.) Method employed for briquetting fine iron ores without the use of a binder. 40c.

17,232—CASE-HARDENING—New Industrial Processes for the Case-Hardening of Steel. F. Giolitti. (Iron and Steel Inst., Oct., 1911, advance sheets; 27 pp., illus.)

17,233—CAST IRON — Volumenvergrösserung und Schwindung des Gusseisens. A. Messerschmitt. (Stahl u. Eisen, Sept. 28, 1911; 6 pp., illus.) Enlargement of volume and shrinkage of cast iron. 40c.

17,234 — CHEMICAL AND PHYSICAL PROPERTIES of Pig Iron. John J. Porter. (Iron Tr. Rev., Nov. 9, 1911; 3 pp.) Paper presented to Pittsburg Faymen's Assn., Nov., 1911. 20c.

17,235—CHILE—Iron Industry of Chile. (Iron and Coal Tr. Rev., Oct. 20, 1911; 1⅓ pp., illus.) Translated from Bull. Soc. des Ing. Civ. de France. 40c.

17,236—CONCENTRATION—A Large Modern Iron-Ore Concentrating Plant. H. Comstock. (Iron Tr. Rev., Nov. 9, 1911; 4⅓ pp., illus.) Description of Mill No. 3 at Mineville, N. Y., operated by Witherbee, Sherman & Co. 20c.

17,237—CUTTING AND WELDING—Autogenous Cutting and Welding of Metals. F. Carnevali. (Iron and Steel Inst., Oct., 1911; advance sheets, 29 pp., illus.)

17,238—ELECTRIC FURNACE—Design of a 30-ton Induction Electric Furnace. Albert Hiorth. (Iron Tr. Rev., Oct. 5, 1911; 3⅓ pp., illus.) 20c.

17,239—ELECTRIC FURNACE—Manufacture of Steel in the Girod Electric Furnace. A. Mueller. (Met. and Chem. Eng., Nov., 1911; 6¾ pp., illus.) Translated from Stahl u. Eisen. 40c.

17,240—ELECTRIC FURNACE—The "Paragon" Electric Furnace and Recent Developments in Metallurgy. J. Härden. (Electrician, Nov. 3, 1911; ½ p.; also Met. and Chem. Eng., Nov., 1911; 2 pp., illus.) 40c.

17,241—ELECTRIC IRON SMELTING in Sweden. Thomas Duncan. (Met. and Chem. Eng., Oct., 1911; 3 pp., illus.) Paper before Am. Electrochem. Soc., Sept., 1911. 40c.

17,242 — ELECTRIC SMELTING — Das Schmelzen der Eisenerze im Elektroschachtofen. (Oest. Zeit. f. B. u. H., Sept. 16 and 23, 1911; 9½ pp., illus.) 60c.

17,243—ELECTRIC SMELTING—The Electric Pig Iron and Steel Plant at Trollhättan, Sweden. (Met. and Chem. Eng., Oct., 1911; 5¼ pp.) 40c.

17,244—ELECTROLYTIC IRON—The Commercial Utility of Electrolytic Iron. James Aston. (Wisconsin Engr., Oct., 1911; 7 pp.) 40c.

17,245—FERROMANGANESE — Ueber das Umschmelzen von Ferromangan im elektrischen Ofen und das Arbeiten mit flüssigen Ferromangan. F. Schröder. (Stahl u. Eisen, Sept. 7, 1911; 4½ pp., illus.) On the remelting of ferromanganese in the electric furnace and the handling of liquid ferromanganese. 40c.

17,245A — FOUNDRY — Die Eisengiesserei der Maschinenbauanstalt C. Mehler in Aachen. (Stahl u. Eisen, Aug. 31, 1911; 3 pp., illus.) The foundry of the C. Mehler iron works at Aix-la-Chapelle. 40c.

17,246—HEAT TREATMENT—The Transformations of Steel within the Limits of the Temperatures Employed in Heat Treatment. L. Grenet. (Iron and Steel Inst., Oct., 1911, advance sheets; 43 pp., illus.)

17,247—ITALY—On the Iron Ore Deposits of Southern Italy and Sicily. G. La Valle. (Iron and Steel Inst., Oct., 1911, advance sheets; 4 pp.)

17,248—ITALY—The Present State of the Metallurgical Industry in Italy. L. Dompé and F. S. Pucci. (Iron and Steel Inst., Oct., 1911; advance sheets, 68 pp.)

17,249—MOLYBDENUM STEEL—The Direct Production of Molybdenum Steel in the Electric Furnace. E. T. Dittus and R. G. Bowman. (Can. Engr., Oct. 19, 1911; 2½ pp., illus.) Abstract from paper before Am. Electrochem. Soc. 20c.

17,250—NICKEL STEEL—Tests of Nickel-Steel Riveted Joints. Arthur N. Talbot and Herbert F. Moore. (University of Ill., Bull. 49, 1911; 53 pp., illus.)

17,251—ORE DRESSING—Magnetic Ore Dressing. R. Cyril V. Whitfield. (Cassier's Mag., Oct., 1911; 6 pp., illus.) 40c.

17,252—ORE-WASHING PLANT of the Oliver Iron Mining Company. C. A. Tupper. (Min. and Eng. Wld., Nov. 11, 1911; 5¾ pp., illus.) 20c.

17,253—REFINING—Possible Reduction of the Power Consumption in Electric Steel Refining Furnaces. Carl Hering. (Met. and Chem. Eng., Nov., 1911; 2 pp., illus.) 40c.

17,254—REFINING—The Grönwall Steel Refining Furnace. Thomas Duncan Robertson. (Met. and Chem. Eng., Nov., 1911; 1¾ pp., illus.) 40c.

17,255 — ROLLING MILLS — Walzbetrieb und Kalibrierung in graphischer Darstellung. Bruno Weissenberg. (Stahl u. Eisen, Oct. 12, 1911; 9½ pp., illus.) The operation and design of rolling mills graphically demonstrated. 40c.

17,256—SOUTH AMERICA—Les Mines de Fer et la Sidérurgie dans l'Amérique du sud et principalement au Chili. Ch. Vattier. (Bull. Société des Ingénieurs Civils de France, Aug., 1911; 38 pp.)

17,257—STEEL HARDENING—Important Principles Connected with Steel-Hardening Furnaces. Shipley N. Brayshaw. (Eng. Mag., Nov., 1911; 5 pp.) 40c.

17,258—TITANIUM STEEL. J. F. Springer. (Cassier's Mag., Oct., 1911; 13 pp., illus.) 40c.

17,259—UNITED STATES STEEL CORPORATION—The Policy of the Steel Corporation. E. H. Gary. (Eng. and Min. Journ., Nov. 11, 1911; 2 pp.) 20c.

17,260—WORLD'S RESOURCES—Development of the World's Iron Resources. Arthur Selwyn-Brown. (Eng. Mag., Oct. and Nov., 1911; 26 pp.) 80c.

LEAD, ZINC AND OTHER METALS

17,261—ALUMINUM—The Vigeland Aluminum Works, South Norway. G. Wüthrich. (Engineer, Oct. 6 and 13, 1911; 7 pp., illus.) 80c.

17,262—BISMUTH—Extraction of Bismuth from Carbonaceous Ores. F. W. Frerichs. (Journ. Ind. and Eng. Chem., Oct., 1911; 8 pp., illus.) 80c.

17,263—LEAD—La Consommation de Combustible dans la Fusion des Minerais de Cuivre et Plomb. G. Ralli. (Rev. Univ. des Mines, June, 1911; 84 pp., illus.

17,264—LEAD AND ZINC—Die Aufbereitungsanstalt der Blei- und Zinkerzgrube Diepenlinchen bei Stolberg (Rhld.). Strassner.

(Metallurgie, Oct. 22, 1911; 5 pp., illus.) The dressing works of the lead-zinc mine Diepenlinchen, near Stolberg. (Rhenish Prussia). 40c.

17,265—LEAD AND ZINC—The Origin of the Lead and Zinc Ores of the Upper Mississippi Valley District. Guy Henry Cox. (Econ. Geol., Sept., 1911; 20 pp., illus.) 60c.

17,266—MANGANESE—Notes on the Manganese-Ore Deposits of Gangpur State, Bengal, and on the Distribution of the Gondite Series in India. L. Leigh Fermor. (Rec., Geol. Surv. of India, Vol. XLI, Part 1, 1911; 9 pp.)

17,267—MANGANESE—On the Age and Continuation in Depth of the Manganese Ores of the Nagpur-Balaghat Area, Central Provinces. L. Leigh Fermor. (Rec., Geol. Surv. of India, Vol. XLI, Part 1, 1911; 11 pp.)

17,268—METALLURGY OF ZINC, TIN, ETC.—Progrès des Métallurgies autres que la Sidérurgie et leur Etat actuel en France. Léon Guillet. (Bull. Société des Ingénieurs Civils de France, June, 1911; 73 pp., illus.)

17,269—TIN—Estimation of Total and Volatile Sulphur in Tin Ores. S. E. Linder. (Min. Journ., Sept. 23, 1911; 1½ pp.) 40c.

17,270—TIN—Prospecting for Tin Ore in the Federated Malay States. J. B. Scrivenor. (Min. Journ., Oct. 14, 21, 28 and Nov. 4, 1911; 7¼ pp.) $1.40

17,271 — TITANIUM — Metallic Titanium. Matthew A. Hunter. (Rensselaer Polytechnic Inst., Feb. 1, 1911; 11 pp., illus.)

17,272—TITANIUM—The Distribution and Uses of Titanium Ores. (Bull. Imperial Inst., Vol. IX, No. 2, 1911; 10¼ pp., illus.)

17,273—TUNGSTEN DEPOSITS in San Bernardino County, California. John H. Williams. (Min. and Sci. Press, Oct. 28, 1911; ¾ p., illus.) 20c.

17,274—VANADIUM in New Mexico; Caballos Mountains Deposits. James O. Clifford. (Min. and Eng. Wld., Oct. 26, 1911; 1⅓ pp.) 20c.

17,275—VANADIUM—Notes on the Chemistry and Metallurgy of Vanadium—III. Warren F. Bleecker. (Met. and Chem. Eng., Oct., 1911; 5½ pp.) 40c.

17,276—VANADIUM—The New Plant of the Vanadium Metals Company at Groton, Conn. (Brass Wld., Nov., 1911; 4¾ pp., illus.) 20c.

17,277—ZINC—Die Entwicklung der Zinkblenderöstung. E. Schutz. (Metallurgie, Oct. 22, 1911; 10 pp., illus.) The development of blende roasting. 40c.

17,278—ZINC—Esperienze di trattamento elletro-termico dei minerali di zinco. F. Sartori. (Rassegna Mineraria, July 1, 1911; 1½ pp.)

17,279—ZINC—Flotation at Zinc Corporation, Ltd. D. P. Mitchell. (Eng. and Min. Journ., Nov. 18, 1911; 3⅓ pp., illus.)

17,280—ZINC—Passing of Sheet-Ground Mining in Missouri. Otto Ruhl. (Min. and Eng. Wld., Sept. 23, 1911; 1⅔ pp.) 20c.

17,281—ZINC—The Treatment of Complex Zinc-Lead Ores, and the Bi-Sulphite Process. (Min. Journ., Oct. 21, 1911; 1½ pp.) 40c.

17,282—ZINC AND CADMIUM in 1910. Smelter Production. C. E. Siebenthal. (Advance Chapter from Mineral Resources of the U. S., 1910; 51 pp., illus.)

NONMETALLIC MINERALS

17,283—ASPHALT—The Production of Asphalt, Related Bitumens and Bituminous Rock in 1910. David T. Day. (Advance Chapter from Mineral Resources of the U. S., 1910; 9 pp.)

17,284—DIAMONDS—A New Diamond Locality in the Tulameen District, British Columbia. Charles Camsell. (Econ. Geol., Sept., 1911; 8 pp.) 60c.

17,285—DIAMONDS—Kimberlite Deposits of Eastern Kentucky. (Min. and Eng. Wld., Oct. 28, 1911; 1⅓ pp.) 20c.

17,286—DIAMONDS—Méthodes d'Exploitation Intensive Employées dan les Champs d'Or et de Diamants Sud-Africains. Maurice Bertrand. (Rev. Univ. des Mines, June, 1911; 26 pp.)

17,287—GEMS—The Production of Gems and Precious Stones in 1910. Douglas B. Sterrett. (Advance Chapter from Mineral Resources of the U. S., 1910; 58 pp.)

17,288 — GRAPHITE — Zur Wertbestimmung des Graphites. Mayer. (Chem. Ztg., Sept. 19, 1911; 1 p.) Concerning the valuation of graphite. 40c.

17,289—LIMESTONES of Oklahoma. L. C. Snider. (Stone, Nov., 1911; 2½ pp., illus.) 40c.

17,290—MINERAL WATERS—The Production of Mineral Waters in 1910. George Charlton Matson. (Advance Chapter from Mineral Resources of the U. S., 1910; 40 pp.)

17,291—PHOSPHATE—A Reconnaissance of the Phosphate Deposits in Western Wyoming. Eliot Blackwelder. (U. S. Geol. Surv., Bull. 470-H, 1911; 30 pp., illus.)

17,292—PHOSPHATE—Florida Phosphate Deposits. E. H. Sellards. (Am. Fertilizer, Nov. 4, 1911; 10¾ pp., illus.) 20c.

17,293 — PHOSPHATE — Japanese Phosphate Deposits. (Am. Fertilizer, Oct. 7, 1911; 5¼ pp., illus.) 20c.

17,294—PHOSPHATE — Modern American Phosphate Plants. James A. Barr. (Min. and Sci. Press, Nov. 11, 1911; 1½ pp., illus.) 20c.

17,295—PHOSPHATE—Preliminary Report on a Portion of the Idaho Phosphate Reserve. R. W. Richards and G. R. Mansfield. (U. S. Geol. Surv., Bull. 470-H, 1911; 71 pp., illus.)

17,296 — PHOSPHATE — Rock Phosphate near Melrose, Montana. Hoyt S. Gale. (U. S. Geol. Surv., Bull. 470-H, 1911; 12 pp., illus.)

17,297—POTASH from Feldspar. B. Herstein. (Journ. Ind. and Eng. Chem., June, 1911; 2¼ pp.) 60c.

17,298—RUBY—Note on the Occurrence of Oriental Ruby in Kimberlite. Harold S. Harger. (From the Trans., Geol. Soc. of South Africa, Vol. XIV, 1911; 8 pp.)

17,299—SALT—Die österreichischen Salinen im Jahre 1909. (Oest. Zeit. f. B. u. H., Oct. 14, 1911; 3½ pp.) The Austrian salt works in 1909. 40c.

17,300—SALT—New Salt Works in Cheshire. (Engineer, Oct. 27, 1911; 3½ pp., illus.) 40c.

17,301—SLATE—The Production of Slate in 1910. A. T. Coons. (Advance Chapter from Mineral Resources of the U. S., 1910; 17 pp.)

17,302—SULPHUR—Italian vs. Louisiana Sulphur. Paul Wooton. (Min. and Eng. Wld., Oct. 21, 1911; ¾ p.) 20c.

17,303—SULPHUR AND PYRITES RESOURCES of Russia. (Min. and Eng. Wld., Oct. 14, 1911; 1 p.) 20c.

PETROLEUM AND NATURAL GAS

17,305 — ALABAMA — Reconnoissance Report on the Fayette Gas Field, Alabama. M. J. Munn. (Ala. Geol. Survey, Bull. 10, 1911; 66 pp.)

17,306—CALIFORNIA—Physical and Chemical Properties of the Petroleums of the San Joaquin Valley, Cal. Irving C. Allen and W. A. Jacobs. (U. S. Bureau of Mines, Bull. 19, 1911; 42 pp., illus.)

17,307—CALIFORNIA—The Oil Industry of California. William Forstner. (Min. Mag., Oct., 1911; 3¾ pp., illus.) 40c.

17,308—FORMATION of Petroleum Accumulations. Wilbur G. Burroughs. (Cassier's Mag., Nov., 1911; 9 pp., illus.) 40c.

17,309—GALICIA—A New Field in Southeast Galicia. The Sloboda-Rungorska District. (Petrol. Rev., Nov. 4, 1911; 1 p., illus.) 40c.

17,310—NATURAL GAS—Analyses of Natural Gas from the Petroleum Fields of Southern California. G. A. Burrell. (U. S. Bureau of Mines, Bull. 19, 1911; 9 pp.)

17,311—VALUATION of Oil Lands. William Forstner. (Min. and Sci. Press, Nov. 4, 1911; 2½ pp., illus. 20c.

ECONOMIC GEOLOGY—GENERAL

17,312—INDIA—General Report of the Geological Survey of India for the Year 1910. H. H. Hayden. (Rec. Geol. Survey of India, Vol. XLI, Part 2, 1911; 38 pp.)

17,313—LUXEMBURG—Die Erzlager in Luxemburg. (Bergbau, Oct. 26, 1911; 2½ pp.) The ore deposits of Luxemburg. 20c.

17,314—ORE DEPOSITS—Copper, Silver, Lead, Vanadium and Uranium Ores in Sandstone and Shale. Waldemar Lindgren. (Econ. Geol., Sept., 1911; 14 pp.) 60c.

17,315 — ORE DEPOSITS — Replacement Orebodies and the Criteria for Their Recognition. J. D. Irving. (Econ. Geol., Sept., 1911; 37 pp., illus.) 60c.

17,316—ORE DEPOSITS—The Genesis of Ore Deposits. Edgar K. Soper. (Eng. and Min. Journ., Nov. 4 and 11, 1911; 6¼ pp.) 20c.

17,317—QUEBEC—Geology of an Area Adjoining the East Side of Lake Timiskaming, Quebec. Morley E. Wilson. (Canada Dept. of Mines, 1910; 53 pp., illus.)

17,318—VIRGINIA—Economic Geology of Richmond, Virginia and Vicinity. N. H. Darton. (U. S. Geol. Surv., Bull. 483, 1911; 47 pp., illus.)

MINING—GENERAL

17,319—ACCIDENTS—Electrical Accidents in Mines: Their Causes and Prevention. H. H. Clark, W. D. Roberts, L. C. Ilsley and H. F. Randolph. (Bureau of Mines, Miners' Circular 5, 1911; 13 pp., illus.)

17,320—AERIAL TRAMWAY and Cable Inclines for Passenger Traffic in Colorado. (Eng. News, Oct. 26, 1911; 1 p., illus.) 20c.

17,321—AERIAL TRAMWAY—Wire-Ropeway Plant at the Orconera Iron Mines, Spain. (Engineering, Oct. 27, 1911; 2½ pp., illus.) 40c.

17,322—ASSESSMENT WORK—The Law of Annual Labor on Mining Claims—I. R. S. Morrison. (Min. Sci., Nov. 2, 1911; 1¼ pp.) Requirements of the statute and various adjudications to determine what does and what does not constitute legal assessment work. 20c.

17,323—BRAZIL as a Field for the Prospector. Alexander P. Rogers. (Min. and Sci. Press, Nov. 4, 1911; 1¾ pp., illus.) 20c.

17,324—BRAZIL—What Brazil Offers Prospectors. George H. Mee. (Mines and Minerals, Nov., 1911; 1½ pp.) 20c.

17,325—COLORADO—Scope and Progress of the Mining Industry in Colorado. (Quart., Colo. School of Mines, Oct., 1911; 23 pp., illus.)

17,326—COMPRESSED AIR—Development in Compressed-Air Power Storage. Frank Richards. (Compressed Air Mag., Oct., 1911; 2 pp.) 20c.

17,327—DAM—Construction of the Morena Rock Fill Dam, San Diego County, California. M. M. O'Shaughnessy. (Proc. A. S. C. E., Oct., 1911; 23 pp., illus.)

17,328—DAM—The Halligan Dam: A Reinforced Masonry Structure. G. N. Houston. (Proc. A. S. C. E., Oct., 1911; 13 pp., illus.)

17,329—DIAMOND DRILLING at Porcupine. Albert E. Hall. (Eng. and Min. Journ., Nov. 18, 1911; ⅔ p.) 20c.

17,330 — DRAINAGE — Sealing Off Mine Water. Edmund B. Kirby. (Eng. and Min. Journ., Nov. 18, 1911; 3 pp., illus.) 20c.

17,331—DRILLING—Records and Costs of Core Drill Borings in 1909-10 by the Nova Scotia Department of Mines, with Summary of Costs for Four Years. (Eng. and Contracting, Oct. 11, 1911; 2 pp., illus.) 20c.

17,332—DRILLING—The Prevention of Dust in Development Drives of Mines During Drilling Operations. C. J. N. Jourdan. (Journ. South African Inst. of Engrs., Oct., 1911; 11 pp.) Discussion on paper previously indexed. 60c.

17,333 — DRILLS — Air Hammer Drills. John Cooper. (Mex. Min. Journ., Nov., 1911; 2 pp., illus.) 20c.

17,334—DURANGO—Pueblo Nuevo District of Durango. L. P. H. Holtan. (Mex. Min. Journ., Nov., 1911; ½ p.) 20c.

17,335—EXPLOSIVES—Electricity in Connection with the Manufacture and Use of Explosives. E. Kilburn Scott. (Iron and Coal Tr. Rev., Nov. 3, 1911; 2½ pp., illus.) 40c.

17,336—EXPLOSIVES—Methods of Testing Explosives by Bureau of Mines. (Coal Age, Nov. 4, 1911; 6 pp., illus.) 20c.

17,337—FINANCE of a Mine.—V. M. H. Burnham. (Min. Mag., Oct., 1911; 2 pp., illus.) 60c.

17,338—FIRST-AID WORK—Illustrations of First-Aid Work. M. J. Shields. (Coal Age, Nov. 4, 1911; 2¾ pp., illus.) 20c.

17,339—FLOW OF WATER in Cylindrical Conduits. Sidney A. Reeve. (Proc. A. S. C. E., Oct., 1911; 10 pp., illus.)

17,340—HAULAGE—Elctric Mine Haulage. G. W. Hamilton. (Electric Journ., Oct., 1911; 4 pp.) Details relating to main entry work. 40c.

17,341—HOISTING—A New Overwind Preventer. Henry Briggs. (Colliery Guardian, Nov. 3, 1911; 1⅔ pp., illus.) 40c.

17,342 — HOISTING ROPES — Förderseile aus Pflugstelldraht am Adalbert-Schachte der k.k. Bergdirektion im Pribram. U. Horel. (Oest. Zeit. f. B. u. H., Sept. 2 and 9, 1911; 8 pp.) Hoisting ropes of Pflug wire. 60c.

17,343—HUNGARY—Bergbau und Hüttenwesen Ungarns im Jahre 1909. (Glückauf, Oct. 14, 1911; 1½ pp.) Mining and metallurgical industry of Hungary in 1909. 40c.

17,344—HYGIENE—Die Hygiene in Berg- und Hüttenwessen auf der Internationalen Hygieneausstellung Dresden, 1911. (Oest. Zeit. f. B. u. H., Sept. 9 and 16, 1911; 2½ pp., illus.) Hygiene in mining and metallurgical pursuits at the Dresden International Hygiene Exhibition in 1911. 60c.

17,345—HYGIENE—Notizen von der internationalen Hygiene-Ausstellung in Dresden. U. Horel. (Oest. Zeit. f. B. u. H., Sept. 30, 1911; 5¼ pp.) Notes on the International Hygiene Exhibition at Dresden. 40c.

17,346—INDIA—The Mineral Production of India during 1910. H. H. Hayden. (Rec., Geol. Surv. of India, Vol. XLI, Part 3, 1911; 65 pp.)

17,347—MANAGEMENT—Applied Methods of Scientific Management—VII. Frederic A. Parkhurst. (Ind. Eng., Oct., 1911; 14 pp., illus.) Time studies and their introduction; analysis of time studies and the development of instruction cards. 40c.

17,348—MANAGEMENT—Efficiency Engineering in Lake Mines. P. B. McDonald. (Eng. and Min. Journ., Oct. 28, 1911; 1⅓ pp.) 20c.

17,349—MINE INSPECTION—Ore Mine Inspection in Missouri. Lucius L. Wittich. (Mines and Minerals, Oct., 1911; 4 pp., illus.) Progress made in reducing mining risks by inspection; peculiar dangers in zinc mines. 20c.

17,350 — MINERS' HOUSES — Colliery Dwelling Construction. A. T. Shurick. (Coal Age, Oct. 21, 1911; 3½ pp., illus.) 20c.

17,351—MINERS' HOUSES—Construction of Concrete Homes for Mine Workers. Frank C. Perkins. (Min. and Eng. Wld., Oct. 14, 1911; 1½ pp., illus.) 20c.

17,352—MINING METHODS—North Star Mining Methods. Claude T. Rice. (Eng. and Min. Journ., Nov. 18, 1911; 4¼ pp., illus.) 20c.

17,353 — NEWFOUNDLAND — Notes on Notre Dame Bay, Newfoundland. Stephen L. Goodale. (Mex. Min. Journ., Nov., 1911; 2¼ pp., illus.) 20c.

17,354—ONTARIO—Mines of Ontario in 1910. E. T. Corkill. (Report Ont. Bureau of Mines, Vol. XX, Part 1, 1911; 23 pp., illus.)

17,355 — OREHOUSE — Tonopah-Belmont Orehouse. Claude T. Rice. (Eng. and Min. Journ., Oct. 28, 1911; ¾ p., illus.) 20c.

17,356 — PRODUCTION — Silver, Copper, Lead and Zinc in the Central States in 1910. B. S. Butler and J. P. Dunlop. (Advance Chapter from Mineral Resources of the U. S., 1910; 68 pp.)

17,357—SHAFT SINKING by Poetsch Method. (Mines and Minerals, Nov., 1911; 2 pp., illus.) Determining direction of bore holes; formation of the ice wall and its resistance to pressure. 40c.

17,358 — SHAFT SINKING — Interessante Erscheinungen aus dem Gefrierschachtbau. Ehrenberg. (Bergbau, Oct. 12, 1911; 1¼ pp.) Interesting phenomena in shaft sinking by the freezing process. 20c.

17,359—SHAFT SINKING—Sinking Operations at the Norma Shaft, Kattowitz, Upper Silesia. B. C. Gullachsen. (Journ. Chem., Met. and Min. Soc. of South Africa, Aug., 1911; 4¼ pp., illus.) 60c.

17,360—SOUTH AUSTRALIA—A Review of Mining Operations in the State of South Australia during the Half Year Ended June 30, 1911. (T. Duffield, Secy. for Mines, Adelaide, South Aust.; 42 pp., illus.)

17,361—STEAM-SHOVEL WORK—Engineering Features of Steam Shovel Work at Bingham. H. C. Goodrich. (Min. and Sci. Press, Nov. 11, 1911; 1½ pp., illus.) Paper before the Utah Soc. of Engrs. 20c.

17,362 — STOPE FILLING — Water-Borne Packing for Stope Filling. Edgar Pam. (Min. Mag., Oct., 1911; 5½ pp., illus.) 40c.

17,363—STOPING—A Method of Underhand Stoping. George A. Laird. (Eng. and Min. Journ., Nov. 11, 1911; 1 p., illus.) 20c.

17,364—STOPING—The Rill System of Stoping. J. Bowie Wilson. (Eng. and Min. Journ., Nov. 18, 1911; 2 pp., illus.) 20c.

17,365 — SURVEYING — Determination of Meridian. D. J. Browne. (Eng. and Min. Journ., Nov. 11, 1911; 1¾ pp., illus. 20c.

17,366—SURVEYING—Remarks on Stadia and Allied Surveys and Survey Rods. W. Newbrough. (Eng. News, Oct. 19, 1911; 1½ pp., illus.) 20c.

17,367—TAXATION—The Principles of Mine Taxation. Edmund B. Kirby. (Eng. and Min. Journ., Oct. 28, 1911; 1⅔ pp.) 20c.

17,368—TIMBER Used in Mining Operations. Compiled by H. R. MacMillan. (Can. Min. Journ.; 5½ pp., illus.) 20c.

17,369 — TIMBERING — Economical Shaft Timbering. Hugh G. Elwes. (Mex. Min. Journ., Oct., 1911; 2 pp., illus.) 20c.

17,370 — TIMBERING — Some Practical Hints on Mine Timbering. James E. Harding. (Min. Sci., Oct. 5, 19, 26, Nov. 2 and 16, 1911; 9 pp., illus.) $1.

17,371—VALUATION—Estimating and Valuing the Future of Mines. Morton Webber. (Min. and Sci. Press, Sept. 16, 1911; 2½ pp., illus.) 20c.

17,372 — VENTILATION — Ventilatori da miniera. (Rassegna Mineraria, July 21, 1911; 3½ pp., illus.) 40c.

17,373 — WIRE CABLES — Formulas for Wire Cables. (Eng. and Min. Journ., Nov. 4, 1911; 1⅓ pp., illus.) 20c.

17,374 — WOOD STAVE PIPE — Experiments on the Flow of Water in Wood Stave Pipes. E. A. Moritz. (Proc. A. S. C. E., Oct., 1911; 44 pp., illus.)

ORE DRESSING—GENERAL

17,375—FLOTATION at Plant of Zinc Corporation, Ltd. D. P. Mitchell. (Eng. and Min. Journ., Nov. 18, 1911; 3⅓ pp., illus.) 20c.

17,376—SCREEN ANALYSES—Illustrating Screen Analyses. J. M. Callow. (Eng. and Min. Journ., Nov. 4, 1911; ¼ p.) 20c.

17,377—SIZING with or without Screens. Carl F. Dietz and Dyke V. Keedy. (Met. and Chem. Eng., Nov., 1911; 4 pp., illus.) 40c.

METALLURGY—GENERAL

17,378—ALLOYS—Ueber die Legierungen des Tellurs mit Zink. Matsusuke Kobayashi. (Memoirs, College of Sci. and Eng., Kyoto Imperial Univ., Vol. III, No. 6, Aug., 1911; 6 pp., illus.)

17,379 — ALLOYS — Untersuchungen über die mechanischen und chemischen Eigenschaften spezifisch leichter Aluminum-Kobalt-Liegerungen. H. Schirmeister. (Metallurgie, Oct. 22, 1911; 5½ pp., illus.) Investigations on the mechanical and chemical properties of specifically lighter aluminum-cobalt alloys. 40c.

17,380—ALLOYS—Volume Changes in the Alloys of Copper with Tin. J. L. Haughton. (Engineering, Nov. 3, 1911; ⅓ p., illus.) Paper before the Institute of Metals. To be continued. 40c.

17,381—CORROSION OF BRASS with Special Reference to Condenser Tubes. Paul T. Brühl. (Engineering, Oct. 6, 1911; 2⅔ pp., illus.) Conclusion of article previously indexed. 40c.

17,382—HEAT RADIATION. Harold P. Gurney. (Journ. Ind. and Eng. Chem., Nov., 1911; 5½ pp.) 60c.

17,383—METALLOGRAPHY—Das ternäre System Kupfer, Silber, Gold. E. Jänecke. (Metallurgie, Oct. 8, 1911; 8½ pp., illus.) The ternary system copper, silver, gold. 40c.

17,384—PYROMETERS—Some Recent Improvements in Pyrometers. R. S. Whipple. (Electrician, Nov. 3, 1911; 2 pp., illus.) 40c.

17,385—PYROMETRY. S. H. Stupakoff. (Am. Foundrymen's Assn., 1911; 15 pp.)

17,386 — RANKIN PROCESS — Proposed Treatment of Sulphide Ores with Nitric Acid, or So Called Rankin Process. (Met. and Chem. Eng., Nov., 1911; 1¾ pp.) 40c.

17,387 — SMELTER FUME. Editorial. (Min. and Sci. Press, Sept. 23, 1911; 1 p.) 20c.

17,388—SMOKE PREVENTION—Economic Aspects of the Smoke Nuisance. John A. Switzer. (Resources of Tenn., Nov., 1911; 12 pp., illus.)

17,389 — TAILINGS — Mine Tailings the Basis for a Growing Industry in the Joplin District. Otto Ruhl. (Min. and Eng. Wld., Oct. 14, 1911; 3 pp., illus.) 20c.

17,390—TESTING WORKS—Eine Musterstätte des praktischen Materialprüfungswesens. Chemisches Laboratorium und chemisch-physikalische Versuchsanstalt von Fried. Krupp. (Stahl u. Eisen, Oct. 5, 1911; 6½ pp., illus.) Model works for practical materials testing. Chemical laboratory and chemico-physical testing station of Fried. Krupp A. G. at Essen. 40c.

MINING AND METALLURGICAL MACHINERY

17,391—BELTING—The Use and Care of Belting—I. (Ind. Eng., Oct., 1911; 3 pp.) 40c.

17,392 — CHURN DRILL — A Homemade Churn Drill. Otto Ruhl. (Eng. and Min. Journ., Oct. 28, 1911; ⅔ p., illus.) 20c.

17,393—CONVEYING and Elevating Machinery, Its Cost and Commercial Value. Reginald Trautschold. (Ind. Eng., Oct., 1911; 4¾ pp.) First article of series dealing with belt conveyers. 40c.

17,394—CRANES—Electric Cranes for Steel Mill Service. E. Friedlaender. (Elec. Rev., Oct. 7, 1911; 3 pp.) 20c.

17,395—ELECTRIC EQUIPMENT — 2300-volt Motors in Zinc Mines at Joplin, Mo., Used for Pumping, Hoisting and Other Operations. (Elec. Wld., Nov. 4, 1911; 1¼ pp., illus.) 20c.

17,396—ELECTRIC FURNACE—Design of a 30-ton Induction Electric Furnace. Albert Hiorth. (Journ. Ind. and Eng. Chem., Nov., 1911; 6½ pp., illus.) Paper before Am. Electrochem. Soc., Sept., 1911. 60c.

17,397 — ELECTRIC FURNACES — Some Engineering Features of Electric Furnaces. Carl Hering. (Proc. Engrs.' Club of Phila., Oct., 1911; 14 pp., illus.) 40c.

17,398—FIRST AID to Mining Machinery—III-V. Henry M. Lane. (Eng. and Min. Journ., Oct. 28, Nov. 4, and Nov. 11, 1911; 9⅔ pp., illus.) 40c.

17,399 — GAS PRODUCERS — Praktische Erfahrungen bei Inbetriebsetzung und Behandlung der Drehrost-Gaserzeuger. K. Munzel. (Stahl u. Eisen, Sept. 14, 1911; 4 pp., illus.) Practical hints for starting and running gas producers with rotatable grates.

17,400—GAS PRODUCERS—Ueber Gaserzeuger. Gwosdz. (Glückauf, Oct. 7, 1911; 11 pp., illus.) Begins with a history of gas producers and discusses the merits of the Mond, Dowson, Smith and a few other producers. 40c.

17,401—HOISTS—Electric Hoists on the Rand. Rowland Gascoyne. (Eng. and Min. Journ., Nov. 18, 1911; 1⅓ pp., illus.) 20c.

17,402—HOISTS—The New Electric Hoists at Ray, Ariz. (Mines and Minerals, Nov., 1911; 2¾ pp., illus.) 20c.

17,403—HOISTS—Using Compressed Air in Steam Hoists at the Anaconda Copper Mines. Frank Richards. (Power, Sept. 26, 1911; 1 p.) 20c.

17,404—MACHINE SHOP—Machine Shop of the Calumet & Hecla Mining Company. (Am. Machinist, Nov. 9, 1911; 4⅓ pp., illus.) 20c.

17,405—OIL ENGINE—Test of an 85-H.P. Oil Engine. Forrest M. Towl. (Journ. A. S. M. E., Nov., 1911; 10 pp., illus.)

17,406—OIL ENGINES. H. R. Setz. (Journ. A. S. M. E., Oct., 1911; 32 pp.)

17,407 — OIL ENGINES — The Internal-Combustion Engine in Modern Practice. Robert L. Streeter. (Eng. Mag., Nov., 1911; 21 pp., illus.) 40c.

17,408—POWER PLANT—British-Canadian Power Company. G. C. Bateman. (Eng. and Min. Journ., Oct. 28, 1911; 1⅔ pp., illus.) 20c.

17,409—POWER PLANT—Novel Features of Mine Power System of Ray Consolidated Copper Company at Hayden, Ariz. C. A. Tupper. (Power, Nov. 14, 1911; 2¼ pp., illus.) 20c.

17,410—POWER PLANT—The Cobalt Hydraulic Company. G. C. Bateman. (Eng. and Min. Journ., Nov. 18, 1911; 1⅓ pp., illus.) 20c.

17,411 — SAFETY APPLIANCES — Underground Safety Appliances. Stephen L. Goodale. (Mines and Minerals, Oct., 1911; 3¼ pp., illus.) 40c.

17,412—STEAM BOILERS—Some Remarks on the Economic Working of Steam Boilers, with Especial Reference to the Automatic Regulation of the Admission of Feed Water Thereto. C. W. Jordan. (Colliery Guardian, Oct. 27, 1911; 2 pp., illus.) 40c.

17,413—STEAM SHOVELS Used in Mining Operations. Frank C. Perkins. (Min. and Eng. Wld., Sept. 30, 1911; 2 pp., illus.) 20c.

17,414—TURBINE PLANT—Untersuchung einer Abdampfturbinenanlage auf der Zeche von der Heydt bei Herne. Schulte. (Glückauf, Sept. 2, 1911; 5 pp., illus.) Examination of an exhaust-steam turbine plant at Von der Heydt colliery, near Herne, Westphalia. 40c.

17,415—VENTILATORS—Centrifugal Mine Ventilators. (Mines and Minerals, Nov., 1911; 1 p., illus.) The construction of the Guibal fan compared with that of a centrifugal ventilator of the newest design. 40c.

17,416—WATER-POWER PLANTS—High-Pressure Water-Power Works. L. Zodel. (Engineering, Aug. 18 and 25, 1911; 7½ pp., illus.) 60c.

SAMPLING AND ASSAYING—GENERAL

17,417—CUPELLATION. R. C. Benner and M. L. Hartman. (Journ. Ind. and Eng. Chem., Nov., 1911; 1½ pp.) Investigation of the relative value of some of the best known cupels regarding silver loss, conditions of surface, etc. 80c.

17,418—FUEL OIL—Specifications for the Purchase of Fuel Oil for the Government, with Directions for Sampling Oil and Natural Gas. Irving C. Allen. (Journ. Ind. and Eng. Chem., Oct., 1911; 4 pp.) 80c.

17,419—GOLD AND SILVER IN COPPER, The Determination of. Edward F. Kern and Albert A. Heimod. (Met. and Chem. Eng., Oct., 1911; 2¾ pp.) 40c.

17,420—NICKEL AND COBALT—Gewichtsanalytische Bestimmung von Nickel und Kobalt. Dede. (Chem. Ztg., Sept. 30, 1911; ½ p.) Gravimetric determination of nickel and cobalt. 20c.

17,421—RARE EARTH MINERALS—The Use of Sulphur Monochloride in the Determination and Analysis of the Rare Earth Minerals. William Brooks Hicks. (Journ. Am. Chem. Soc., Sept., 1911; 4¾ pp.) 60c.

INDUSTRIAL CHEMISTRY

17,422 — ATMOSPHERIC NITROGEN — The Fixation of Atmospheric Nitrogen. John Woods Beckman. (Elec. Rev., Sept. 9 and 16, 1911; 6 pp.) 40c.

17,423—ATMOSPHERIC NITROGEN—The Manufacture of Nitrogen Compounds by Electric Power. E. Kilburn Scott. (Electrician, Sept. 15, 1911; 1 p.) 40c.

17,424—FERTILIZERS — Inorganic Nitrogenous Plant Foods: A Brief Description of Their Occurrence, Manufacture and Uses. F. J. Machalske. (Am. Fertilizer, Oct. 7, 1911; 15¼ pp., illus.) 20c.

PERSONAL

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

H. V. Winchell has been visiting New York.

Sydney H. Ball, of New York, is in Mexico on professional work.

H. C. Wilmot, of Baker City, Ore., is in New York for a few weeks.

M. L. Requa, who spent November in New York, has returned to San Francisco.

W. R. Bauder has been appointed manager of the McIntyre mine, Porcupine, Ontario.

E. P. Mathewson, of Anaconda, and C. G. Kelly, of Butte, have been in New York this week.

William M. Brewer has retired from the management of the Matanuska Gold Mines, Ltd., in Alaska.

C. H. James has been investigating gold properties in the Manitou Lake district on behalf of an English company.

A. C. Stoddard, recently at the Old Dominion mines, has been appointed superintendent of the Superior & Boston mine.

W. G. Rice, president of the Superior & Boston Copper Company, has just completed a visit of inspection to the mine.

F. S. Witherbee, president of Witherbee, Sherman & Co., Inc., has returned to New York from an extended trip abroad.

Dr. L. D. Ricketts, who sailed for Europe on Nov. 11, is expected to return to New York about the middle of December.

George H. Garrey has returned to San Francisco after a month spent on geological-examination work in mines in Plumas county, California.

John Wilson, formerly mine captain of the Preston East Dome, has been appointed manager of the Little Pet mine, in the Porcupine district, Ontario.

George M. Richards, who has been for a year past in charge of development operations at the Iron Mountain mine, Latouche, Alaska, has returned to New York.

D. F. Sandys Wunsch has accepted a position as assistant mining engineer for a tin-mining company operating in Africa. His address is Naraguta P. O., Bauchi, Northern Nigeria.

H. J. Wallace has resigned as superintendent of construction for the Mason Valley Mines Company at Thompson, Nev., and has joined the staff of the Inspiration Copper Company at Miami, Arizona.

H. S. Matthews, formerly vice-president and general manager of the Alabama Consolidated Coal and Iron Company, has been elected president of the company to succeed Joseph H. Hoadley, resigned.

Quincy A. Shaw, president and R. L. Agassiz, vice-president of the Calumet & Hecla Mining Company, have returned to Boston after a tour of inspection of the various properties in which they are interested in the Lake Superior country.

Sidney G. Koon, who has been engaged in metallurgical work for the Jones & Laughlin Steel Company, Pittsburg, particularly in the openhearth department, has resigned to join the staff of Walter B. Snow, publicity engineer, Boston.

D. L. H Forbes has moved his offices to No. 72 Queen W., Toronto, Ont., where he will practise mining and metallurgical engineering, with metallurgical testing and designing on behalf of the Meritt Metallurgical Company, of San Francisco.

E. W. Oglebay, of Oglebay, Norton & Co., Cleveland, dealers in ore, is being talked of as a candidate for the United States senatorship in West Virginia. While having large business interests in Cleveland, Mr. Oglebay has maintained his residence in Wheeling.

W. H. Williams, manager of the properties of the reorganized American Mexico Mining and Development Company, at Velardeña, Durango, Mexico, has gone to Chicago to attend a meeting of the board of directors; during his absence Charles I. Auer acts as manager.

John D. Wanvig, Jr., late superintendent of the Superior & Boston Copper Company, has become associated with the firm of Weed & Probert, Los Angeles, Cal., as chief assistant. He will accompany Mr. Probert on a trip to the Guanajuato district in the interest of the Proprietary Mines Company.

A. A. Blow, recently consulting mining engineer with the White Investing Company, of New York City, has severed his connection with this company and will resume the practice of his profession as consulting and mining engineer, making a specialty of mine development and ore dressing, with offices in both London and New York.

Arthur Cooper, managing director of the Northeastern Steel Company, Ltd., has been chosen by the council of the Iron and Steel Institute to succeed the Duke of Devonshire as president of the institute in May next. The presidency is held for two years, the duke having been elected in 1909, in succession to Sir Hugh Bell. Mr. Cooper was elected a member of the institute in 1874, was appointed on the council in 1894, and became a vice-president in 1906. In 1892 he was awarded the Bessemer gold medal for his services to the metallurgy of iron and steel.

OBITUARY

Thomas B. Davis died at Keyser, W. Va., Nov. 26, aged 83 years. Colonel Davis, his brother, H. G. Davis, the late Ex-Senator Stephen B. Elkins and R. C. Kerens purchased West Virginia coal and timber lands many years ago, developed them and built the West Virginia Central & Pittsburg Railway from Cumberland to Elkins, W. Va. This line they later sold to the Western Maryland Railroad Company, continuing the construction of the Coal and Coke Railway from Elkins to Durbin, W. Va. He was largely interested in coal mining and other industries, and to him was due the first development of the Potomac region of West Virginia.

William Edwin Harris, of Niles, O., who was known as the "father of American tinplate," died Nov. 17. Mr. Harris was born in England in 1835. He entered a rolling mill at the age of 14. He came to this country when 25 years old, and was employed in the rolling mills at Covington and Newport, Ky. In 1876 he erected a mill in Chicago, and was third owner, but this was destroyed in the great Chicago fire. In 1891 he made several trips to Europe to learn the manufacture of tinplate, and that same year rolled the first sheet ever produced in America. In 1892 he, with Warner Arms and others, organized the Falcon Tin Plate and Sheet Company, at Niles, O., which was purchased by the American Sheet and Tin Plate Company in 1899, at which time Mr. Harris retired from active life.

SOCIETIES and TECHNICAL SCHOOLS

University of Washington—For the fifteenth time in its history the College of Mines will hold its short session for mining men, beginning on Jan. 4, 1912, continuing to April 1. This course is open to all mining men who wish to spend the "lay-off" season in taking up courses in mining, milling, mineralogy, geology, chemistry, assaying, metallurgy, mine surveying, mining law and other related subjects. Opportunity is given the men entering these courses to visit the mines, smelteries and plants near Seattle, Tacoma and Everett; and to make free use of the milling and metallurgical laboratories to concentrate and test their own ores. Courses in coal mining, given in conjunction with the mine-rescue work at the Bureau of Mines station, are offered to coal-mining men. No preparation is required to enter these courses, neither is there any charge, except for materials used. Last year 26 men attended the short session. Their ages varied from 21 to 53 years, and they came from Alaska, British Columbia, California and other mining regions.

Editorial Correspondence

Reports from our own Representatives on Important Events from Many Important Mining Centers of the World

San Francisco

Nov. 22—The initial meeting of prospectors and miners, assembled for the purpose of forming a permanent organization of national scope, held at Bishop, Inyo county, on Nov. 3, is to be followed by another at the same place, Dec. 14. The committee appointed to prepare the call for the next meeting is composed of Earl C. Dart, of Goldfield; W. M. Snyder and M. H. Kunze, of Bishop. The first meeting was attended by representatives of various camps in western Nevada and southeastern California; it is expected that the second will have a larger representation of the interests of prospectors and small miners from other mining States as well as California and Nevada. The resolutions adopted declare the purpose of the proposed organization in a general way, and set forth the complaint, which is by no means confined to the men composing this initial gathering, that there is a marked antagonism on the part of various bureaus of the Federal Government to the mining industry. This complaint is particularly directed against the forestry bureau, in many instances based on good grounds. But the men who propose an organization of prospectors and miners having for its prime purpose the remedying of the actual evils of Federal interference or regulation may have to learn, as others are learning, that these evils are not wholly the evils of Federal policy. And unless they shall go back of the trouble and learn the exact causes that have brought about the condition complained of, their efforts toward a remedy will be ineffective. Unless they lay aside prejudice and vindictiveness that have marked the general expression of disapproval of Federal regulation, and seek a remedy through wise and commendable revision of the mining laws and the technical improvement of the Government bureau service, they are likely to create greater antagonism.

There are numerous instances of record where proved mineral in place has been denied the right to patent by the reports of agents of the forest reserve, and there are smelteries idle because of the apparent desire of Government agents to conserve scrub timber of no practical worth. If the prospectors and miners at the meeting on Dec. 14 will devote a part of their efforts to the task of inducing the Administration to put the Government departmental bureaus on the same plane of technical and scientific competency that applies in the Geological Survey and the Bureau of Mines, the evils complained of will greatly diminish. This is not the time for fighting, but for wise and expedient political suasion, backed by determination and sincerity.

Denver

Nov. 25—Reports of the good effects of the recent flow of water opened by the deep drainage tunnel in the Cripple Creek gold mines, are coming in rapidly, and it is now apparent that in all probability the deep levels of the mines over nearly the entire camp will be unwatered. It is reported that the 1050-ft. level of Stratton's Independence, after being drowned since 1907, is now dry and being worked. In the Portland mine, Manager Frank Small states that the water is only 30 in. above the 1050-ft. level, and that in four days the water receded 9¼ in. This level will be worked again soon. In the Gold Coin shaft the water is said to have receded 3 ft. In the C. K. & N. vein of the El Paso company a large body of high-grade ore has been opened in the south drift from the Fuller crosscut on the tunnel level. Twenty feet of drifting on the orebody has already been done. The 1000-ft. level of the El Paso shaft has been reclaimed and is being cleaned of the seven years' accumulation of débris. At present the flow from the portal of the tunnel, according to Engineer Countryman's measurement, is 8000 gal. per min., and in the shafts of the mines on Battle mountain the water is receding at the rate of 3 in. per day. In the tunnel heading the rock is close and hard and but little water is coming from it. More than three-fourths of the entire flow is coming from the C. K. & N. vein.

The actual result of the "Grub Stake Fund," which was financed in the spring by private subscription, shows that the 60 prospectors sent out, located 10 claims in Gold Hill, four in Grand Island and two in Sugar Loaf mining districts, all three being in Boulder county; five in Hahn's Peak and two in Slavonia districts, both in Routt county; three in Gold Brick mining district, Gunnison county; one in California district, La Plata county; two in Jackson county and one in Montezuma county. The prospectors get a half interest in the claims, the other half being vested in Charles A. Johnson, president of the Chamber of Commerce. This body will turn over its interest to the Colorado Grubstake and Mining Company, now being organized, its purpose being the development of such of the claims located as are found worthy. This company will issue to the Chamber of Commerce in lieu of its interest, a certain percentage of the company's stock, and also of its earnings, if any, the latter to be devoted by the Chamber to the exploiting of the resources of the State. Those who contributed to the grub-stake fund will also receive stock at par in amounts equal to their contributions.

Butte

Nov. 22—For the purpose of giving instruction in "mine-rescue" work and "first aid to the injured" to all miners who wish to take advantage of modern methods as set forth by the Government, a car of the Bureau of Mines, in charge of a force of competent instructors, with Leonard Farnell as foreman, has arrived in Butte, where it will be stationed until Dec. 1 or later, and will be open daily to those interested. H. M. Wolflin, superintendent in charge, is on his way here from Pittsburg, and a public demonstration will probably be given upon his arrival. The working staff of the car, consisting of the foreman, a "first-aid man" and an engineer, is able to instruct about 21 men per day in three groups of seven each, and the complete course requires about seven days, the hours of instruction being from 9 to 12 and from 1 to 5 p.m. Complete instruction is given in the use of the helmets and treatment of all injuries of a local nature, immediate attention to which is so often the means of saving life and limb. To those who have mastered the use of the smoke and gas helmets certificates are issued, and double certificates to those who master both the use of the helmets and the "first aid to the injured" methods. The certificates are a means used by mine managers to identify those of their employees competent to be used in emergencies as rescue workers.

The October report from the Government assay office, at Helena, shows that Madison county led all other counties in the State in the production of gold, with a total of $60,429. The output from the various counties was: Beaverhead, $62; Broadwater, $1842; Chouteau, $15,595; Deer Lodge, $20,042; Granite, $729; Jefferson, $2055; Lewis and Clark, $17,228;

Madison, $60,429; Meagher, $88; Missoula, $4913; Park, $384; Powell, $3652; Silver Bow, $2605; Sweet Grass, $96.

Salt Lake City

Nov. 23—Smelting conditions in the Salt Lake and Tooele valleys at the middle of November had not changed materially from those of the month preceding. There has been a moderate increase in shipments, principally of silver-lead ores. The general ore market is good. There has been a large tonnage of lower-grade ores coming in to the valley smelteries from ore stored on dumps, in stopes, etc., and other ore, which can now be marketed at a profit. The amount of higher-grade silver-lead ores coming in is about normal for this season of the year. From present indications, it appears as though there would be an increase in the lead output of Utah for 1911. From the tonnage standpoint the amount of ore coming in is good.

The number of furnaces in blast the middle of November was as follows: The United States Smelting Company, at Midvale, was running five furnaces on lead ore, its usual capacity. The Huff electrostatic zinc plant was treating 50 tons of zinc middlings from the wet concentrator. The American Smelting and Refining Company, at Murray, had six furnaces in blast, all on lead ores, there being no furnace on matte concentration in use at present. The company has two switching engines moving ore in its yards, which has not been the case for some time, indicating that more ore is being received and handled. A large amount of this consists of sulphides, which are being stockpiled. The copper smeltery of the American Smelting and Refining Company, at Garfield, is running two blast furnaces and four or five reverberatories. The usual tonnage smelted varies from 1800 to 2100 tons of ore per day, and the plant at present is prepared to handle as high as 1000 tons of concentrates per day. The International company's new smeltery, at Tooele, is running three reverberatories on copper ore, and treating about 700 tons per day. A high record of about 328 tons per furnace in 24 hours was made recently. Should more ore be received the fourth reverberatory furnace is ready for operation, and could be blown in at any time.

Deadwood

Nov. 24—Recent cold weather, quite severe, and coming earlier in the year than ordinarily expected, has caused some of the mines considerable trouble. Nearly all of the mills suffered and the result was a loss of time in most of the plants and a corresponding decreased production. At about the same time the Redwater ditch, carrying water to the Consolidated Power and Light Company's hydroelectric plant, burst in two places, making it necessary for this company to fall back on its steam-generating station at Pluma. A temporary coal shortage made full operation at this plant a serious problem for several days. This promised to be quite serious for the miners, as nearly every property in the northern Hills uses power purchased from this company. Everything is running smoothly at the present time, and as the mills are prepared for cold weather, little further trouble is expected during the coming winter months.

Negaunee, Mich.

Nov. 24—The Cleveland-Cliffs company is putting into blast the charcoal pig-iron furnace at Gladstone, Mich., which has been closed down for several months, during which time extensive repairs and alterations have been made. The company does not anticipate a ready market for the iron, but desires to utilize the large stock of wood on hand and to take care of the surplus ore at its mines on the Marquette and Swanzy ranges. The Gladstone furnace will be improved to correspond with the company's Pioneer furnace at Marquette which has undergone an extensive remodeling during the last few years under the direction of a German chemist who has so developed the byproduct department for the manufacture of chemicals from the wood used, that pig iron is now the byproduct and the chemicals form the chief product. Austin Farrell is manager of the furnace department of the Cleveland-Cliffs Iron Company.

Porcupine

Nov. 24—Since the recent Federal elections, when the Conservative party carried the country, the Ontario government has been agitating for the payment of a bonus of $6400 per mile to the Temiskaming & Northern Ontario railway, which serves the Cobalt and Porcupine camps. If this bonus is paid it is believed that the railway will have to come under the jurisdiction of the Dominion Railway Commission, which will be of great benefit to the people of northern Ontario. At present they suffer from unjust freight rates, telegraph and telephone tolls and are unable to obtain redress in the courts. Should the railway come under the supervision of the commission this would be changed, the people would have a chance to air their grievances and a considerable expansion in the lumber and pulp business and in agriculture might be looked for.

Hurricanau seems to be the latest gold district, and several good discoveries are reported in that section. It is a few miles east of the Ontario-Quebec boundary, and near the head waters of the Hurricanau river. Not enough is known as yet regarding the district to form any estimate of its possibilities.

Toronto

Nov. 25—Agitation for a renewal of the iron and steel bounties abolished by the late government has been started. On Nov. 22 a strong deputation representing the iron and steel interests, including Pres. J. H. Plummer, of the Dominion Steel Corporation, Thomas Cantly, of the Nova Scotia Steel and Coal Company, T. J. Drummond, of the Lake Superior Corporation, and Cyrus Birge, of the Steel Company of Canada, waited upon Premier Borden and other members of the government. They asked for the renewal of the bounties on pig iron as a provisional measure of relief pending a general revision of the tariff, claiming that the lowering of duties and the creation of exemptions had placed the industry in Canada at a disadvantage. The question of the bounty on steel rods was not raised, the consideration of that matter being deferred until later. The government gave the deputation a sympathetic hearing.

Alamos, Mexico

Nov. 10—The additional 10 stamps recently installed in the Zambona mill, at Minas Nuevas, have now been dropping for several weeks and the result is quite satisfactory. The mill is crushing from 80 to 100 tons of ore daily, or slightly more than double the former capacity. For two or three years the development work has been going on steadily in the mines, while the cyanide plant was treating the immense pile of tailings that had accumulated. The present condition of the ore reserve is such that the mill can be operated on the output of the mine alone, and the remaining tailings will be held for future treatment. The mine is now developed to a depth of about 750 ft., and it is said that the orebody has a width of 40 ft., all of which is being stoped.

T. P. Brinnegar, who suspended operations in the Promontorios district during the recent revolution, has returned to Alamos; he has resumed work in two shafts on his property, and will start on a third shaft in a short time. Mr. Brinnegar states that he has a fine showing of silver sulphides and native silver in a wide vein. He will probably put in new steam hoists early in 1912.

George W. Dubés has installed steam hoists and compressors, and is developing his mine as rapidly as possible. It is reported that a mill and cyanide plant may be built on this property within a few months.

Rafael Ibarra, of Promontorios, is developing the San Manuel, and treating a small quantity of ore in arrastres. It is stated that this mine, which was discovered only 18 months ago, has been bonded for $250,000. The ore is in a fissure vein followng more or less closely the contact between granite and an intrusion of andesite.

The Mining News

Reports of New Enterprises. New Machinery. Installations. Development Work and Property Transfers. The Current History of Mining

Alaska

It is estimated that the output of the Iditarod for the season will be about $3,500,000. There are about 2500 persons wintering at the camp.

Pioneer—This property, situated near Fairbanks, has been leased to Henry Cook and G. White, who are planning to start operations as soon as possible.

Arizona

Gila County

Miami—The fifth unit of the concentrator is still incomplete. All other equipment for this unit has been installed. Installation of machinery and equipment is in progress in the sixth and last unit, and the third generator set is being installed in the powerhouse. The mining method in use has thus far worked out successfully. One of the rooms, or shrinkage stopes, has recently been mined out, 27 per cent. of the ore being removed in the process of mining, the rest being held in reserve. After the preliminary work of driving the auxiliary raises and building chutes, gates, etc., had been completed, the amount of ore broken in the stope averaged 173 tons per machine-drill man per day, and, including all men working in the stope, the average was 151 tons per man per day. These surprising figures are due, of course, to the fact that the force of gravity was utilized and much of the ore mined itself.

Inspiration—The experimental mill is expected to start this week, and J. W. Callow, consulting metallurgist, is now at the mine and will supervise the tests. Topographical surveys are in progress at Wheatfields, 18 miles from the mine. There is practically no underground work going on at present.

Southwestern Miami—Churn-drill hole No. 1 is now 1200 ft. deep, and has been in ore for the last 100 ft. The ore has the same general character and appearance as the Live Oak ore, and there seems to be no doubt that it is a continuation of the Live Oak orebody. This hole is the deepest one that has ever been drilled in this district, and has been drilled at considerable expense and under great difficulties. It is hoped to be able to drill sufficiently deep to determine the thickness of the orebody. Three-inch tools are being used at present. This is the first time that tools of this small size have been used in this district.

Superior & Boston—A station is being cut in the McGaw shaft at the 12th level and exploration of the veins by diamond drilling continues. The 1000-gal. Prescott station pump is being moved from the sixth to the 12th level. A similar pump is stationed on the 10th level. A. C. Stoddard, formerly with the Old Dominion, was recently made superintendent, succeeding J. D. Wanvig.

Arizona Commercial—Pumping has been discontinued and the mine is now entirely idle. Pres. Charles S. Smith, of the Old Dominion, who will be president of the reorganized Arizona Commercial company, recently made a visit to the property and stated that the reorganization would probably not be effected until after Jan. 1; that the outstanding bonds will have to be foreclosed and the property sold to the new company, and that the new company would start with no less than $300,000 in the treasury. He further stated that the Superior & Boston, under some equitable arrangement, can best develop that part of the ground tributary to the Eureka shaft, which has just been closed down, and that future work will probably be confined to that part of the property adjoining the United Globe ground of the Old Dominion.

Yavapai County

Consolidated Arizona—Smelting at Humboldt has been discontinued, the ore supply being insufficient to keep the large furnace in operation. A small reverberatory, more suited to the output of the tributary district, will be built.

California

Amador County

South Jackson—The vein in the three-compartment shaft at a depth of 60 ft. is showing strong mineralization. A temporary horse hoist has been installed. Work has also been resumed in the old shaft, 100 ft. north of the main shaft. New machinery may be needed soon. Adam Huber, Jackson, is manager.

South Amador—Three crosscuts are being driven from the 500-ft. level. The west vein is showing good quartz. No new work has been done on the east vein. A new boarding house is being erected. J. McSorley, Jackson, is superintendent.

Empire-Pacific—Surface improvements at this mine, near Plymouth, include a blacksmith shop, sawmill and a new water pipeline, 2½ miles long.

Bunker Hill—The cleanup for the last month's run is reported as more than $34,000. Elisha Hampton, recently engaged as superintendent, has taken charge.

Butte County

Chico Consolidated Gold Mining Company—This is a new incorporation, composed of Chico men, organized to operate in this county. The directors are: J. W. Roper, L. W. Roper, J. E. Spurgeon, J. M. Meyers and F. M. Anderson; capitalization is $100,000.

Humboldt County

Prospect Hill—A small cyanide mill has been installed at this mine, near Orleans. The vein, opened in a 90-ft. raise from the tunnel, is 32 in. wide and carries ore reported to assay $4.85. J. A. Hunter is managing owner.

Inyo County

Bishop Creek—This Wilshire company has suspended operations for the season. It is reported that E. W. Walters, engineer, who recently examined the property, will recommend a 50-ton mill. J. S. Chapman, Bishop, is superintendent.

Napa County

Carl Brown—A road is being constructed for hauling in machinery to operate this paint mine, with a view of introducing the material at the Panama-Pacific exposition. The property is situated two miles south of Calistoga, and contains sienna, red oxide of iron and kaolin. White paint of good quality has been produced and practically applied to house painting.

Plumas County

Hose—The five-stamp mill on this property on Willow creek will be operated by waterpower, and the wheel is being installed. Becker & Ichler, Oakland, are owners.

Engle Copper—Burleigh drills are to be installed at this mine in Lights cañon. Forty men are employed at the mine and smeltery.

Shasta County

Victor—The new Nelson mill, at the property of this power and mining company, is in commission and a concentrator is being installed.

Siskiyou County

Ault & King—Johnson & Baggs have taken a purchase bond on this quartz property at Six Mile creek, which, several years ago, was a rich surface producer.

McKinley—The mine and mill, situated on Humbug creek, and the Jacket and

Sanbourn groups have been purchased by Capt. J. C. Nash, of Medford, Ore.

TEHAMA COUNTY

Northern California—Two electric motors and other machinery, part of the equipment of the Strom suction dredge under construction at Jelly ferry, have been received at Red Bluff. About 50,000 lb. of machinery are *en route*.

TULARE COUNTY

Himalaya—One hundred-pound chrysoprase rock was recently shipped from this mine to New York. This shipment is reported to contain some of the finest stones in this property. The value of the shipment is said to be $7500.

Colorado

CLEAR CREEK COUNTY

Ruler—In this mine, on Griffith mountain, Georgetown district, a streak of ore 8 in. wide has been opened that carries 1.5 oz. gold and 30 oz. silver per ton. The vein is 12 ft. in width and the average grade is $16 per ton.

Seven Thirty—Eight inches of gray copper have been opened by Erickson & Co., lessees, assaying 400 oz. silver and 30 per cent. lead.

Capital—The largest raise ever opened in the history of Clear Creek mining is to be put through on the Aetna vein of this mine. It will be 1775 ft. high and 445 ft. have already been completed. The production of this mine for the present year is estimated at $250,000.

CRIPPLE CREEK DISTRICT

Gold Dollar—Since the completion of the Mabel M. shaft to the 680-ft. level, on Beacon hill, six cars have been shipped from an oreshoot which has been opened for a distance of 160 ft. and is 4 ft. wide. A car of screenings brought $40 per ton in gold and it is stated that the coarse rock is worth $16 per ton.

Ocean Wave—This mine, on Battle mountain, Dell & Allen, leasers, is said to have enough ore developed to maintain an output of four cars per week of mill ore for some time.

School Section Leasing Company—The main oreshoot of the company at 500 ft. is richer than at 450 and an output of 25 cars per month of 1-oz. gold ore is being made.

El Paso—It is reported that this company, working on the C. K. & N. vein at the tunnel level, has opened a 40-ft. vein of ore that will average $35 per ton, and that there are 500 ft. of stoping ground at this shoot.

Doctor-Jack Pot—During the last quarter the amount received in royalties from lessees was $3180; cash reserve, including ore in transit, $16,418.

Isabella—A rich strike is reported in this company's property on Bull hill, the streak being 3 in. wide and seamed with native gold. There are 30 sets of lessees in the properties of the company, most of whom are shipping ore.

LAKE COUNTY—LEADVILLE

George F. Campion has secured a lease on the Chip, Wild Cat, Hope, Dillon and Nils Augusta, and has started work to find the carbonate of zinc, quantities of which are to be seen on the dump of 16 years ago. The shaft is 300 ft. deep and a 22-h.p. electric hoist has been installed.

Helena—The mine, in Iowa gulch, is shipping steadily a good grade of lead ore from the 500 and upper levels. A drift has been started to open this orebody on the 600 level.

Lilian—In this mine, in Iowa gulch, W. Murcray, lessee, has opened the carbonate of zinc orebody for over 500 ft. The deposits are bunchy but seem to be the richest in the district, carrying about 40 per cent. zinc.

Sunday—The output of this mine, in California gulch, by sublessees, is about 300 tons per month of $40 lead ore.

Dome—The lessees are shipping a good tonnage of zinc carbonate ore, which is low grade, but gives a fair margin of profit.

Fairview—The mine, in Adelaide park has had the shaft retimbered to the 225-ft. level; new buildings have been erected and an electric hoist and Ingersoll-Rand drills installed. Work has been started and a body of low-grade ore has been opened in the quartzite. Steady shipments are being made.

OURAY COUNTY

Wanakah—In the mines of this company, which are in the gold belt below Ouray and adjoin the celebrated Nettie, one of the caves typical of this quartzite belt has been encountered; it is 75 ft. wide and 75 ft. in length and 250 tons of the red, earthy, oxidized ore were taken out. It is estimated that this will run $100 per ton in gold. It was found in the Iron Clad claim, first owned by William Weston and Thomas Gibson, and sold by them to the late Thomas F. Walsh and later acquired by the Wanakah company.

Idaho

COEUR D'ALENE DISTRICT

Constitution—A strike of high-grade galena is reported in this mine on upper Pine creek. The ore was encountered in the upper workings and the vein varied from 2 to 3 ft. in thickness. Little zinc is present in the ore, so that a high-grade product may possibly be obtained by sorting. The company has erected new cabins and is prepared to work on the new orebody throughout the winter.

Nellie—The work at this mine has been progressing rapidly since the recent strike. The first carload of high-grade lead-silver ore has been shipped to the smeltery. The proceeds will be put into further development.

Orofino—A new foreman and two new shift bosses have been engaged as a result of the recent unsuccessful operation. There are at present about 70 men at work underground. A 135-ton mill is in operation on the property.

CUSTER COUNTY

A report has been received from this county of important mineral deposits. The veins of copper, gold and silver ore are said to vary from 10 to 40 ft. in width and can be traced for miles over the country. Some development work has been done which seems to indicate the worth of at least a few of the veins. A tungsten vein, which has not been developed at all, and a sheet-mica deposit of marketable size are also reported. A few small placer deposits were found and by working these the prospectors have been able to make a living. This district, however, is in a remote part of Idaho, which accounts for its slow development. It is 225 miles from a railroad and can be reached by wagon road and trail only. A railroad is now being planned to open the district and several surveys have already been made.

Michigan

COPPER

Old Colony—The company has started No. 12 drill hole at a point about 1000 ft. northeast of the No. 11 hole, just completed, to cut the formation at a point nearer surface. No. 11 hole encountered copper at depth.

Tamarack—The management has practically suspended all opening and development work and is centering its activities in straight mining which is resulting in an increase of about 300 tons of rock in the daily shipments to the mill.

Oneco—The shaft is down about 925 ft. on its way to a depth of 1200 ft., at which point lateral openings will be driven. Stations have been established at regular intervals and from several of these, crosscuts have been driven to the lode, showing copper.

Wyandot—The assessment called recently is to provide funds for further exploratory work

Keweenaw—It is reported that owing to unsatisfactory results, the company has discontinued all work in the exploratory shaft on the Kearsarge lode.

Victoria—At No. 6 shaft, which recently entered copper ground at about 800 ft., a plat is being cut at a point that corresponds to the 11th level of the old workings.

New Arcadian—It is reported that diamond drilling has indicated that the eastern standstone contact is considerably farther east than was originally supposed. Two diamond drills are at work. It is said that the drilling has resulted in add-

ing nearly a half section to the possible mineral area.

Isle Royale—It is said that recent underground developments are gratifying and that the grade of the output is increasing appreciably. October operating costs are reported to be especially satisfactory. The unwatering of the Huron workings, commenced several months ago, is proceeding rapidly, and will soon be completed.

Iron

Spring Valley Mining Company—This company, operating the Zimmerman mine in the Iron River district, has received several carloads of new machinery for equipping shaft No. 2, being sunk southeast of shaft No. 1. In preparation for mining a large deposit, the new installation will be of permanent nature and includes a steel headframe, a Marion, 60-ton, stockpile steam shovel, Ingersoll-Rand compressor, orecrusher and hoist. The Zimmerman mine is southeast of the Baltic mine of the Verona Mining Company and includes 80 acres of land.

Lake Superior Land Company—This company that controls mineral lands west of Ishpeming and near the North Lake mine of the Cleveland-Cliffs company has voted to increase the capital stock from $80,000 to $500,000. The additional stock will be issued gradually for the purpose of inducing the owners of other lands to pool their holdings with the corporation in order to hasten the development of the district as a whole. P. P. Chase, of Negaunee, is president and F. M. Moore, of Marquette, is secretary.

Escanaba Exploring and Mining Company—The company has been organized with a capitalization of $500,000, by Escanaba, Milwaukee , Marinette and Chicago men. Options have been secured on 6 forties of land in S. 17—T. 43—R. 34, south of Sunset lake and about four miles northeast of Iron River. The nearest known orebody is that at the Bates mine, about one mile to the southwest, which is controlled by Ladenberg, Thalmann & Co., that owns the Florence mine at Florence, Wis. Rudolph Oshinsky, formerly a business man of Iron River and Marinette, promoted the company and is to act as manager.

Minnesota

Cuyuna Range

The Cuyuna Northern railroad is laying steel on its five-mile extension from Deerwood to the Section Thirty mine, 35 men being employed on the work. An additional 225 men are engaged in grading. A house track, about one-quarter mile long, will be run from the main line to the mine.

Mesabi Range

Bangor—Two men were recently injured in a hoisting accident. The engineer is said to have lost control, causing too rapid descent. The men were riding on the cage with some logs.

Sellers—A recent accident resulted in the death of one man, employed as a trackman. He is said to have been working with his back to the train which ran him down.

Montana

Butte District

Butte Central—Word has come from Boston that the company will build a 100-ton concentrator at the Ophir property and work upon it will probably be commenced in time to have it ready for operation in the spring. Shipments of the high-grade ore mined on the 300-ft. and 500-ft. levels are now being made to the Washoe smeltery and returns from the last 50 cars of 50 tons each, gave an average of $19.57 net to the company.

Tuolumne—The shaft has reached the 1800-ft. level and the sump is being cut; by Dec. 1 the work of cutting a station on the 1800-ft. level will probably be commenced, and cross-cutting to the south vein will be started before Jan. 1. About 100 tons of ore, averaging about 9 per cent. copper with good silver content are being shipped daily to the Washoe smeltery. Work of erecting the new hoisting engine is being rushed and material for the new steel headframe has arrived. This will be erected over the one now in use so that no shutdown of the mine will be necessary. The new plant will be ready for operation probably about Jan. 1, when the daily output will be considerably increased.

Broadwater County

Black Friday—This mine has been a steady shipper for the last four months and has averaged from 10 to 15 tons per day. As the oreshoot is small, it is impossible to put out a large tonnage, but the ore is the highest grade found in the camp.

Ohio-Keating—The mine has been making an occasional shipment from the ore sorted from development work. Stoping is now being done in the 200 south drift and drifting on the vein is in progress on the 200 north. Besides the development work on the Ohio vein, crosscutting east to the Iron Dollar vein is being done and some rich surface oxide ore has been mined. It is hoped the present work will develop equally good sulphides. Shaft sinking has also started with the intention of making it 200 ft. deeper.

Deer Lodge County

Butte-Georgetown Mining and Milling Company—This company consisting of Frank Boucher, president; Dr. H. Maillet, secretary; Charles E. Farnsworth, treasurer; Dr. F. L. St.Jean, manager, and J. A. Nadeau, D. Dorais, Christ Yegen, Henry Avare, C. J. Cutler, C. M. Sawyer, Ovila Nadeau, A. Sylvain, and F. Sylvain, all Butte and Anaconda men, has obtained possession of 700 acres of placer ground in California gulch, 200 acres on Lost creek, and 160 acres on Mill creek, all in the vicinity of Anaconda, and in addition owns five claims in the Georgetown district. The intention is to operate the properties on a large scale next season. A force of men is at work testing both the Georgetown and the California gulch properties. The gold is in a coarse form and is quite easily saved, bedrock having an average depth of from 6 to 12 ft. If the tests warrant, two dredges may be ordered.

Southern Cross—It is reported that Amalgamated interests have purchased this gold mine in the Georgetown district, from Ex-senator Mantle and associates. The mine is an old producer. Instructions are said to have been issued to Butte officials to extend the Butte, Anaconda & Pacific railway to this district, 10 miles west of Anaconda.

Lincoln County

Blacktail—At this mine in the West Fisher district, near Libby, a small force of men has been at work most of the summer, blocking out ore and preparing the stamp mill on the property for operation. Not long ago the mill was started but was only run a few days before the cold weather forced a suspension.

Madison County

Watseka—In line with the revival of mining activity in the Rochester district, plans are being made by Mr. McCune, owner of the Watseka mine, which has been closed down for a number of years, to reopen the property. The mine is down several hundred feet, and being the deepest in the district has always been handicapped by the large amount of water draining in from the surrounding mines. Mr. McCune contemplates the use of electricity in unwatering and working the property, as formerly steam was used at great expense, due to the scarcity of fuel.

Nevada

Comstock Lode

Union Consolidated—The annual report of Superintendent Symmes submitted at the stockholders' meeting last month shows that during the last year the company has saved in its prospecting work on the 2400- and 2500-ft. levels ore giving a gross assay value of $11,053. Regarding the prospecting work on the 2500-ft. level, the report states that the north drift from the south boundary line is following the same stringer formation encountered when the ore was first found, and it is the intention to extend the drift along the formation in the hope that it will lead to a well defined body of good ore. To date, 229 tons of ore have been taken

from the drift, averaging $16.17 per ton. It is also stated that the joint three-compartment winze with the Sierra Nevada in Union ground will be pushed down to the 2700-ft. level as rapidly as possible. The winze is opening up a promising stringer formation, and will give from 700 to 1000 ft. of absolutely virgin ground to prospect when crosscutting begins. Assays as high as $4.85 per ton have been secured from the material taken from the winze.

Ophir—The recovery from the mine last week was $17,000, a heavy tonnage being stoped from the 2100- and 2200-ft. levels. A run of 2000 tons of ore has just been completed at the mill, and a shipment of concentrate and bullion made from the cleanup.

Ward Shaft—The new Scranton pumps on the 2100 and 2475 stations have been placed in commission and are doing satisfactory work. The water is raised from the 2475 to the 2100, and from there to the Sutro tunnel drain at the 1600-ft. level.

Mexican—From present indications it is probable that the new mill will be started before Dec. 15, the date originally set. Repair work at the shaft has been completed to a point where work in the mine has been resumed on part time. Repairs have been made to the Mexican winze hoist.

Elko County

Some good ore was recently found in one of the mines in the Gold Circle camp. Water power is expected to be developed soon and electric power generated.

Humboldt County

Gold Crown—This mine recently made a rich strike. The ore is chiefly gold, averaging about $20 per ton, and at present the vein is 9 ft. wide. The mine is now installing a larger pump. Joseph H. Playter is manager. This camp lies 12 miles south of Golconda, Nev., and is reached by the narrow-gage railroad built some years ago by the Glasgow & Western company for the mines there.

Lander County

The new mining camp of Carroll, about 20 miles south of Austin, is attracting much attention; many have taken options on property and numbers are flocking to the district. George Wingfield has secured one of the properties.

New Mexico

Ernestine—The new orebody opened below the main tunnel is over 20 ft. wide and is said to average $40 per ton. During the last week 570 tons of ore were milled, producing 50 sacks of concentrates in addition to the bullion. At present the company is installing new mortars for the batteries and is only running part of the stamps.

Deadwood—The mine is running steadily and a good oreshoot has been opened on the third level west.

Oaks—The new shaft has been in ore for the last 18 ft. The main tunnel is being pushed ahead.

Socorro—Rapid progress is being made with the erection of the new power house.

Philadelphia—The company is hauling machinery from Oro Grande to Organ. The 28 men are now working in two shifts and a car of ore is being shipped every two days.

Snake—A 5-ft. body of ore was recently opened in a raise from the 500-ft. level of this mine in Sierra county.

Treasurer—The final survey for a gravity wire-rope tramway has been completed. The creek is furnishing ample power to operate both mine and mill.

Oregon

Sunnybrook—The owners of this property, Baker county, are planning development work for next spring.

Ibex—This mine, which has been idle for several years, was operated during the last summer and some good ore was uncovered. The property is owned by the Arthur Hill estate, Sumpter.

South Dakota

Lawrence County

Homestake—The work of setting the poles for the high-tension transmission line between Spearfish cañon and the distributing station at Lead, is practically finished and the wires will soon be strung.

St. Louis Placer Mines Company—Work has been suspended for the season, according to Manager Thompson. Nothing further will be done until spring, when the dam will be completed. This will be undertaken as soon as the frost leaves the ground.

Carbonate—The Black Hills Development and Financial Corporation, which has been operating the Iron Hill, Seabury-Calkins and other mines at Carbonate under lease, has suspended operations on these properties and Manager Bunce states that work will be undertaken upon a well known piece of ground near Rochford.

Pennington County

Sherman Brothers, of Pactola, have during the last two summers thoroughly prospected a large territory of land at and near Pactola, and state that a dredge will be put in next year.

Castle Creek Dredge—After 5½ months' operation, this dredge has suspended for the winter. Satisfactory results were secured for this, the first season for the boat, and work will be resumed at as early a date as possible next spring.

Utah

Beaver County

Horn Silver—The monthly output is between 800 and 1000 tons, coming largely from the 900-ft. level, and from other points above where leasers are at work. Some of the higher-grade ore runs from 15 to 20 per cent. lead, with from 6 to 10 oz. silver. Shipments are being made to the International smeltery at Tooele. The mill recently overhauled is not at present in operation.

Imperial—Leasers at this property have shipped two cars of ore reported to run 14.6 per cent. copper. A new shaft was sunk in high-grade ore.

Rob Roy—Sixty-nine sacks of high-grade ore and 23½ tons of lower grade have been hauled to Milford for shipment. The property is in the Newhouse mining district north of Beaver City.

Sheep Rock—The Robinson lease on this property in the Newton mining district will expire in a few weeks and local men are interested in the question of securing a bond and lease. The property has produced some gold ore of good grade.

Box Elder County

Promontory—Work has been resumed on this company's claims, north of the Southern Pacific railroad. The main shaft is down 105 ft., and a contract to continue sinking has been let. Small assays in gold and copper have been obtained. B. D. Siegfus is president and manager.

Lion Gold—A tunnel has been driven 270 ft., on this property in the Park Valley district, near the Susanna and the Century, and is following a vein 1 to 3 ft. between walls.

Century—During the summer the company has been sluicing old tailings from which it is reported to have recovered $2500. The stamp mill is not being operated. One drawback is the difficulty in obtaining suitable power, as coal costs $14 per ton delivered.

Juab County

Tintic shipments for the week ended Nov. 17 were 159 cars, this being an increase of one car over the week preceding.

Nebo Summit—Articles of incorporation have been filed by this company to operate three claims in the Nebo mining district. The capital is $10,000, in shares of 1c. each. L. H. Harmes is president.

Uncle Sam—A break is being followed south of the one previously developed, and has shown about 2½ ft. of ore.

Selma—Arrangements are being made to connect with the Telluride Power Company's line, after which it is proposed to sink the main double-compartment shaft, which is now down 60 or 70 ft., to greater depth.

Iron Blossom—Prospecting on the 600-ft. level south of the No. 1 shaft has opened what is thought to be the same shoot of copper ore which was cut when the shaft was sunk.

Yankee—Leasers are working on the upper levels, while the company is prospecting on the 1700-, 1900- and 2000-ft. levels from the main shaft. The 1700 station is in limestone showing manganese and iron. Drifting east and west is being done on the 1900-ft. level. The waste is hoisted to the 900-ft. level and dumped into the cave encountered in shaft sinking.

May Day—Leasers working on various levels from the 100- to the 1000-ft. level, are making shipments. Royalties from leasers amount to from 20 to 50 per cent., according to the grade of the ore. Shipments on company account are sufficient to meet operating expenses.

Mammoth—Copper ore of good grade is being mined in a stope from the 800-ft. level.

Beck Tunnel—Weekly shipments of 120 tons of silver-lead ore have been made, and new ore is being opened up. The south drift from the main tunnel has followed the vein over 300 feet.

United Tintic—Ore reported to run well in silver has been opened in the Aspinwall vein on the 280-ft. level. The fissure is 4 ft. between walls. Active development is being carried on.

Summit County

Daly—This company's stock has been listed on the Salt Lake Exchange. J. E. Bamberger is president, Herbert Cohn secretary, and W. S. McCornick treasurer. The capitalization is 150,000 shares, all issued, par value $20, the stock being assessable. There is a cash balance of $53,649.

Thor—What promises to be an active campaign of development has begun at this property, which adjoins the Daly-Judge on the southwest. A tunnel is being driven, whose prospective length is about 1600 ft., which will give a depth of 1000 ft. at the deepest point. It has been driven 150 ft., and a contract for another 150 ft. has been let. At the completion of the 300 ft., it is expected that a large vein outcropping on the surface will be cut. The Snake Creek drain tunnel will cut the property at great depth, and will afford drainage and eventually transportation facilities. It is estimated that it will take about 1½ years for the Snake Creek tunnel to reach the Thor.

Tooele County

Lion Hill Consolidated—Active development is being carried on. It is reported that a considerable tonnage of milling ore has been blocked out.

Ophir Hill Consolidated—The electrical equipment for the drain-tunnel transportation system, by which ore will be hauled to the concentrating plant, has been completed. The tunnel is 3300 ft. long. It is said that the management is planning to install a slime plant, with which addition the capacity of the mill will be increased to 200 tons. No definite date has been set for resuming operations.

Galena King—Fennell & Driscoll, leasers on this property at Stockton, have shipped two cars of ore and have a third ready. After several months of dead work, ore is being mined on the 750- and 1000-ft. levels. James Creighton, formerly superintendent of the Dalton & Lark, is in charge.

Morrison—A vein averaging from 8 to 20 in. of high-grade galena and carbonate ore is being followed and the last car shipped carried 29 per cent. lead, 169 oz. silver and $3 in gold per ton. The property is being operated by Goodall & Works.

Utah County

Pacific Gold Mining and Milling—Work is being done from the tunnel by means of an incline at 40 deg., which is now down 60 ft. The vein has been followed several hundred feet in the tunnel and is from 1 to 4 ft. wide, carrying milling and shipping ore. The latter runs about $30 per ton in lead, silver and gold. The milling ore taken out in development is of good quality and is being stored on the dump.

Eudora Bell—Development has been actively carried on during the fall, and some shipments were made.

Live Yankee—This property is reported to have made occasional shipments, some of which ran high in silver and lead.

Miller—Two sets of leasers are working and have made shipments reported to run between $30 and $50 per ton.

Washington

Summit—Some good ore has been encountered on this property in Ferry county which is under lease to R. J. Spencer and O. D. Sanford, of Orient.

San Poil Consolidated—This company is considering the installation of a 125-ton mill at the property near Republic. Robert A. Koontz, Spokane, is president.

Elizabeth Gold Hill—Considerable new machinery, including a 10-stamp mill, has just been installed at this mine in Yakima county. R. Myers, North Yakima, is superintendent.

Gold Cube—Development work on this property near Addy, Stevens county, has disclosed some rich ore. The company is planning more extensive operations. J. M. Perry is manager.

Copper Cliff—This property has been taken over by T. E. Wilson, of Spokane, who will operate it on a larger scale than heretofore.

Surprise—Operations at this mine in the Republic district, Ferry county, are continuing satisfactorily, daily shipments averaging one car and the ore assaying about $33 per ton.

Wisconsin

Zinc-lead District

Coker—The new mill at the mine was started in operation, Nov. 27, by the Mineral Point Zinc Company; the old plant was destroyed by fire on Aug. 6. The mine has been producing for 30 years. Fourteen air drills will be used underground.

Vinegar Hill—This company has subleased the Sunrise property, which will be operated in conjunction with the Ellesworth mine adjoining.

East End Mining Company—The company has been incorporated to open up the Seitz land just east of the Klar Piquette, litigation pending with Charles Kistler *et al.*, owners of the mineral right, having been settled recently.

American Zinc Ore Separating Company—The company has announced that the electrostatic separator will be rebuilt at Platteville next spring.

Frontier—The company is sinking a shaft on the Sedgewick land, at Benton, and will also open up the Hirl lease.

Lucky Twelve—The company has completed a roasting and magnetic separating plant at its mine in New Diggings township.

Canada

British Columbia

Payne Mines, Ltd.—This company has been organized to operate the Payne mine, near Sandon, from which the last shipments were made in 1904. Interested in the new company is Robert E. Strahorn, of Spokane, an official of the Oregon-Washington Railroad and Navigation Company, together with a number of prominent Washington men. The company also has options on several other properties in the Slocan district, but operations at first will be confined to the development of the Payne mine. A lower crosscut tunnel is now being driven to open the vein at a depth of about 1400 ft., or about 600 ft. below the deepest of the old workings.

British Columbia Copper—The smeltery at Greenwood is handling about 1500 tons of ore per day, which is about 75 per cent. of the plant's capacity. As soon as sufficient coke is available, full capacity will be reached. The company is exploring a number of properties under bond, including the Greyhound, near Greenwood, the L. H. group near Silverton, several claims near Danville, Wash., and the Voight, near Princeton. On all of these, operations are still in the preliminary stages. During the winter a filter press will be added to the

equipment of the mill at the Napoleon mine, at Boyds, Wash., the object being to conserve the water and to reduce the amount of pumping. It is also expected to increase the extraction. Iron ore is shipped intermittently from the surface of this property.

ONTARIO

Ophir—A new plant, including a 60-h.p. boiler, hoist and air compressor, is being installed on this property in the Lake of the Woods district. The shaft is in good ore at the 100-ft. level.

ONTARIO—COBALT

Ore shipments for the week ended Nov. 24 were as follows: Nipissing, 206,200 lbs.; La Rose, 170,040; Coniagas, 64,480; Drummond, 60,000; McKinley-Darragh, 59,740; Colonial, 44,500; Kerr Lake, 40,500; total, 645,460 pounds.

Crown Reserve—Several new ore-shoots have lately been opened. The Ross vein on the 170-ft. level has widened to 4 in. of ore, stated to carry 6000 oz. per ton. A winze put down to the 200-ft. level and a crosscut at that depth showed the grade to be maintained. The shoot, which is 70 ft. in length, was found in the Keewatin under the conglomerate. No. 17 vein has also been showing up well. A 2½-in. stringer, cut in putting down a winze, has been followed for 80 ft. and carries high-grade ore.

La Rose—The output during the first nine months of the year amounted to 2,751,946 oz. of silver, having a gross value of $1,444,271. Shipments during this period totaled 3,179,958 oz. The income was $1,453,958, and expenses $536,868, resulting in an operating profit of $916,765, or an average of approximately $102,000 per month.

Temiskaming—This company will pass the dividend for the current quarter in order to finance the deal for acquiring a controlling interest in the North Dome mine, at Porcupine.

ONTARIO-PORCUPINE

Consolidated Swastika—This company has purchased the Young & Laroque claims which adjoin the Lucky Cross.

Lucky Cross—Good ore was recently encountered in sinking and the results of the development work as a whole are promising. At 20 ft. depth the vein which was 2 ft. wide on surface had widened to 5 feet.

Dome—Arrangements have been made with this company to have a part of the rich surface gold exposure taken out intact and placed on exhibition in the Bureau of Mines, Toronto. The present stormy weather is holding back the steel work and the completion of the mill may be at a later date than was originally expected.

Pearl Lake—No. 4 diamond-drill hole is down about 700 ft. and has encountered the same mineralized zone that was cut by No. 1 hole. The core gives good assays.

Crown Chartered—This company will install a plant on the Davidson claims which it has under option.

McAuley—Burr E. Cartwright has definitely abandoned his option on this property in Bristol township. The engineer in charge states that the gold contents met with in 80 ft. of sinking and 1200 ft. of drifting averaged less than 80c. so that there appeared to be no object in further development.

Watson—These claims are stated to have been optioned to a New York syndicate.

Miller-Middleton—Noah A. Timmins, of the Timmins-McMartin syndicate, states that the orebody is fully 10 ft. wide. A shaft is down 50 ft. on the bluff and a crosscut being driven to connect with it is now in 200 feet.

Watson—These locations, five in number and lying east of Three Nations lake, have been taken over by P. P. Lyon & Co., New York. Two shafts will be put down.

Apex—A contract has been let to sink the two shafts now down about 40 ft., to the 110-ft. level. Two 80-h.p. boilers and an eight-drill compressor have been installed.

Mexico

CHIHUAHUA

The smeltery at Terrazas, owned by Corrigan-McKinney interests, was blown in during the first week of November, and it was expected that all the furnaces would be in operation by the end of the month.

Cusi Consolidated—This property in the Cusihuiriachic district was acquired by the company now owning it about seven years ago, but because of the poor transportation facilities it was decided not to work the mine until such conditions could be bettered. With the advent of the railroad in the district, the mine will be thoroughly developed. C. L. Graves is manager.

Chihuahua-Potosi—Another rich strike was recently made at this property, the third within a period of 90 days. The ore found in the other strikes is still being worked, and shipments to the smeltery bring large returns.

Descubridora—Shipments from this property to the Chihuahua smeltery have been started, and will be maintained. For the last year the property has been under development work only, the results of which have turned out remarkably well. Development work will be continued. P. H. Williamson is in charge.

Esperanza—This property, in the Placer de Guadalupe district, was recently sold for $40,000. It is a gold property and has been a producer since early last year.

Estella—A shaft, 6½x15 ft., at present 185 ft. deep, was sunk over 100 ft. in one month, establishing a record for shaft sinking in the Santa Eulalia district. W. T. Swoyer is in charge.

Capitanena—This property, in the San Francisco del Oro district, under the management of D. H. Bradley, Jr., will be equipped with a 10-stamp mill, which will be in operation before Feb. 1. A gas-producer power plant will also be installed.

Compañia Minera de Naica—The new 250-h.p. boiler has been installed. It is rumored that an option of purchase of the property has been secured by a Parisian syndicate after a favorable report by Mr. Degoutin, the engineer sent to examine the mine early this year.

OAXACA

San Juan Taviche—At this property the 3000-ft. hoist, which was received six months ago, is just being completed, and the production from the mine probably will be increased during the next few months.

Cubilete—The company formed to operate this group of mines on Chivo hill in the Taviche district is now actively engaged in development work. On the lowest level, 500 ft. from the surface, the best ore yet found has been opened. There is claimed to be 60,000 tons of profitable ore in sight, and the owners are planning the erection of a mill.

SONORA

Pichaquate—Engineers are now examining this mine, 40 miles east of Alamos, owned by Roy and Titcomb, of Nogales. The equipment includes a hoist and 10-stamp mill.

Greene-Cananea—The production for the month of October from the smeltery was a little over 6,000,000 lb. of blister copper. This is the greatest output in the history of the company and surpasses the output of September by 600,000 lb. Of the 6,000,000 lb., one-third was that of the Miami Copper Company, the result of the month's run of concentrates.

Mesa Rica—This company is considering increasing its mill capacity. New machinery has recently been received for this purpose at the property about 35 miles south of Montezuma. A. C. Tanner is in charge.

Cerro Gordo—The new smeltery of this company, near Cumpas, in the Magdalena district, is now being operated with 12 men under the superintendency of O. L. Neer. It is stated that the ore averages over $300 per ton.

Sonora Copper Smelting Company—The smeltery of this company near Noria will be blown in about Jan. 1. The smeltery is some distance from the mines of the company, the latter being at Cobre Grande, and an aërial tramway is now being built between the mines and the reduction plant. Alfred Alford is superintendent and general manager.

The Markets

Coal Trade Review

New York, Nov. 29—The coal-trade situation generally is improving, with a better demand and a tendency to higher prices. This is due in part to the cold weather which has prevailed over a large part of the country; and in part to an apparent increase in the demand for steam coal, which is reported from many places. In the West this has had the effect of increasing the working time at many mines, and a better feeling is beginning to possess operators. Car supply is fairly good, as a rule; but there is some complaint about delays in transportation on many roads. The Lake trade is closing up for the season, and little coal will be shipped to the Northwest after this week.

The seaboard bituminous trade is more active, and there has been some firming up of prices; without any general advance, quotations are more firmly held than they have been. There is not much free coal at seaboard points to disturb the market.

Anthracite trade is strong, both for domestic and steam sizes. The absorption of the larger production of anthracite through the summer and fall has been a notable feature of the situation.

Coastwise trade is suffering from a short supply of vessels, and rates are higher than they have been for two years. Off-shore trade is also good, and there is a better demand for boats for South America and the West Indies.

Coastwise shipments of coal from chief Atlantic ports, nine months ended Sept. 30, long tons:

	Anthracite	Bituminous	Total
New York	10,481,055	7,901,283	18,382,338
Philadelphia	1,596,658	3,635,544	5,232,202
Baltimore	190,614	3,132,403	3,323,017
Newport News	.....	1,971,412	1,971,412
Norfolk	.....	3,308,260	3,308,260
Total	12,268,327	19,948,902	32,217,229
Total, 1910	11,522,786	19,205,909	30,728,695

New York covers all the harbor shipping points; including barge shipments to city wharves.

IRON·TRADE·REVIEW

New York, Nov. **29—The iron and steel trades continue to show a large volume of business, and the tendency is still to place orders further ahead than has been the rule for some time past. Some observers think that the market has nearly touched bottom, so far as prices are concerned; but there is an active competition for going business, and concessions are made in several lines. Some contracts are reported placed with packers for next season's tinplate supplies at concessions from the recent reduction. Bars**

Current Prices of Metal, Minerals, Coal and Stocks, Conditions and Commercial Statistics

are also at a low point, and the car builders are getting plates, for the equipment orders noted last week, at pretty low prices.

Structural steel continues to do well, and it is evident that low prices have encouraged building projects, both large and small. Plates are active, as might be expected. Smaller material is reported as selling well and jobbers intimate that their trade is good.

The increased call for steel seems to have started a better demand for pig iron, not only bessemer and basic, but also foundry, for which more and larger orders are reported. Pig-iron prices remain low, and there is a good deal of competition among the furnaces. Southern iron is reported placed at $9.75, Birmingham, for early delivery, though $10 is still asked for next year.

The Bethlehem Steel Company is now in the market as a seller of pig iron. It is announced that it will probably have a surplus of about 200,000 tons yearly over the requirements of its steel plant.

The Oriskany Iron and Ore Company has arranged to build a blast furnace at Lynchburg, Va. The furnace will have a daily capacity of 125 tons of iron. The company has contracted with some large fertilizer manufacturers to furnish 100 tons daily of pyrites residues, and this material will be mixed with local hematite ore.

Baltimore

Nov. **27—Exports for the week included 1,210,642 lb. iron pipe to Antwerp; 54,570 lb. wire and 44,800 lb. nails to Belfast; 4,073,224 lb. structural steel, 1,252,559 lb. steel plates, and 2,097,847 lb. miscellaneous iron and steel to Panama.**

Imports for the week included 1598 tons ferromanganese from Liverpool; 6900 tons manganese ore from Vizigapatam, India; 17,100 tons iron ore from Cuba.

Birmingham

Nov. **27—Southern pig-iron manufacturers are delivering more iron than they are making, but the market is quiet. The prices at which iron sells in this section are rather weak, $10 per ton, No. 2 foundry, being the top quotation. There are some sales being booked for immediate delivery, while some business is coming in for delivery during the first half of 1912. The accumulated stock of pig iron is a source of worry still in Southern territory and in all probability may be the cause for a reduction in the make. Furnaces in operation are not doing as well as they have, cold weather having a little effect.**

Some change in the steel make will be reported during December, a reduction in production at both the plants of the Tennessee company at Ensley, and Southern at Alabama City. The Tennessee company is trying a new plan, combining the openhearth with the bessemer process. It is understood that beginning after Jan. 1 there will be a need for steady operation at both Ensley and Bessemer.

Chicago

Nov. **28—The iron market is very quiet in all its essential respects. Pig iron is in demand only for current needs and the exceptional buyer, who figures on the needs of the second quarter or the latter part of the first quarter, is very watchful of the market. He refuses to buy any large amount into the second quarter, at any price which the sellers regard as reasonable.**

Southern No. 2 is quoted at $10, Birmingham, or $14.35, Chicago delivery, and Northern No. 2 at $14, local furnaces, with possible shadings of these prices, but nothing openly appearing to cut the price. There are inquiries yet pending for a few large needs, which probably will not result in contracts very soon, because of the waiting attitude of both buyers and sellers.

As the situation seems from this point of view, the producing element in the iron market—of pig iron—is yet weak and will continue indefinitely to be weak in view of the large influences operating powerfully now to unsettle business. The sale of iron and steel products, generally considered, is slow. There is considerable buying by railroads that have come to the limit of profitable holding off and are coming into the market for their actual needs.

In structural material there are some good-sized contracts negotiated from Chicago, but few requirements locally, though the market conditions are fair for the beginning of winter. Bars remain strong, with the local mills meeting Pittsburg competition and then cutting some-

what; steel bars are sold at 1.18@1.23c., with the lower prices made on much business. Plates find a good sale at 1.334c., Chicago delivery, and sheets have a steady, light to fair, market. Wire goods are weak.

Cleveland

Nov. 27—The Pittsburg Steamship Company started its last cargoes from Lake Superior Nov. 21 and from Escanaba Nov. 23. Other shippers are about closed. As a number of boats have been laid up, a few wild boats managed to get premiums of 10 or 15c. per ton to bring down a few closing cargoes.

Pig Iron—Some good inquiries are on the market and a number of small sales are reported. Bessemer pig is quoted at $15.15; No. 2 foundry $13@13.25; forge $12.50, all Cleveland delivery.

Finished Material—Structural steel continues active, low prices having brought out a number of small orders and some larger ones. Bars, plates and sheets are quite active. Sellers are pushing for business, and prices are consequently low all around.

Philadelphia

Nov. 29—The general uplift in the iron and steel industry has had a profound influence upon this market. Large transactions have been closed in the local market as well as for New York, New Jersey and New England delivery but much of this business is the outcome of the inquiries and negotiations started two or three weeks ago. Makers admit a good many inquiries are being received and that orders are likely to be placed on inquiries made a few days ago. The general run of small consumers are on the point of ordering more fully. Large consumers are credited with the purpose of buying for deliveries to be extended over the half year. Forge is more active than for several months. Basic is dull, though there is better prospect than for some time for large transactions. Every day develops something of interest and while prices have not advanced, strengthening conditions are manifest. No. 2 X foundry is $15; best gray forge, $14.50; and basic is to be had, it is rumored, at $14.50, but the usual quotation is $14.75 per ton.

Steel Billets—The only transactions are in forging billets. Openhearth rolling billets are coming in for heavy buying.

Bars—Bar iron is disappearing through jobbers' hands and the influx of mill orders indicates a little anxiety to secure iron because of the low condition of stocks everywhere. A few mills have already secured business that will insure fair activity until midwinter. Common iron is especially active. All recent business has been done at extremely low figures.

Pipes and Tubes—Merchant pipe is stronger than for months, although the volume of business is still below the average. Tubes are again quite active, though discounts rule low.

Plates—The largest week's business for several months has been done in plates. Local shipyards have contributed to the improved demand. Manufacturers are satisfied that the market has turned definitely in their favor.

Structural Material—The rush of car contracts, bridge work, shipyard work and general construction work has contributed very materially to strengthen the position of the structural manufacturers. A good deal of the work contracted for has not yet been covered by contract with the mills. It is claimed that small orders cannot be placed at figures given two weeks ago.

Pittsburg

Nov. 28—The improvement in the iron and steel trade noted in the last two weeks has broadened in its scope, buying of raw materials by iron and steel interests having become heavy. Seven contracts for coke for 1912 are reported, the largest covering about 35,000 tons monthly from the Rainey interest to the Youngstown Sheet and Tube Company, at $1.65, ovens. Five others are reported for the twelve-month, aggregating 48,000 tons monthly, at $1.65@1.75, and one for 10,000 tons a month for six months, at $1.60, making an aggregate of over a million tons for next year, or substantially one-half the total merchant output of the Connellsville region, which is subject to annual or semi-annual barter. Buying of pig iron has likewise been heavier. On a break from the long quoted $10, Birmingham, price, sales of Southern iron aggregating perhaps 20,000 tons for next year have been made at $9.75. A Cincinnati steel interest has bought 15,000 tons of Valley basic, and two Allegheny River interests 3000 and 500 tons, respectively, while the Jones & Laughlin Steel Company has bought a large tonnage of scrap, with the option of diverting a large part of it to its new plant at Aliquippa; and contemplating the starting of this plant to supplement its Pittsburg plant it is inquiring for 25,000 to 50,000 tons of basic iron.

The finished-steel market as yet shows no improvement in prices, although one straw is the fact that the Cambria Steel Company has withdrawn its 1.05c. price on merchant bars and now quotes a minimum of 1.10c. The sheet market has greatly broadened in activity, there being heavy buying for deliveries over the first half of next year at extremely low prices, representing only a slight advance over what is done on small lots for early shipment, although such prices show a decline in the past fortnight.

The general feeling in the local iron and steel trade is that there has been further progress in the line of improvement observed in the past two reports. In most branches of the finished-steel trade the report is that the volume of specifications for early rolling keeps up well, and is practically as large as last month. Some mills find an actual improvement in steel-bar tonnage. There is little if any decline in the volume of material required by the general trade, which speaks well for the season, since usually there is a falling off toward the close of the year. The heavier railroad buying should turn the scale in favor of heavier operations this winter.

Pig Iron—Outside of the inquiry just mentioned, it is observed that steel works are much more interested in pig iron. The American Rolling Mill Company, Middletown, has bought 15,000 tons of basic in the Valleys, for delivery December to February inclusive; a plant at Brackenridge has bought 500 tons and a plant farther up the Allegheny 3000 tons, for shipment to April 1, the last two sales being at $12.25, Valley. Some small sales of bessemer have been made at $14.25, Valley, and the market is firm at this figure. Buying of foundry iron has broadened, some foundries taking hold for the first quarter. McKeefrey furnace, at Leetonia, will blow in about Jan. 1, and is installing chill-casting apparatus so that it will be able to make basic iron. Punxy furnace will blow in next week. We quote: Bessemer, $14.25; basic, $12.25; No. 2 foundry, $13.25; malleable, $12.50; forge, $12.75, all f.o.b. Valley furnaces, 90c. higher delivered Pittsburg.

Ferromanganese—The market has become slightly more active, but consumers are still chary about contracting at the advanced prices, and there appear to be odd lots available for prompt shipment at under the syndicate figure. We quote $37.50@38 for prompt and $38@38.50 for forward delivery, f.o.b. Baltimore.

Steel—Adjustments on December tonnages on billet and sheet-bar contracts are expected to be at substantially the ruling market, which we quote at $18.75@19 for bessemer billets, $19 for openhearth billets, $20 for bessemer sheet bars and $19.50@20 for openhearth sheet bars, Pittsburg.

Sheets—The market has been active on contracts for first half in the past fortnight, a large tonnage being sold by the mills which have been leaders in the low-price movement. On such contracts 1.80c. has been done on black and 2.80c. on galvanized, slightly higher figures being sometimes obtained. Prompt sheets are available at a shade under these figures. We quote, f.o.b. Mahoning Valley mill: Black sheets, 1.80@1.85c.; galvanized, 2.80@2.85c.; blue annealed, 1.35@1.40c.; painted corrugated, $1.30@1.35; galvanized corrugated, $2.40@2.45 per square.

St. Louis

Nov. 27—Current business is running into larger orders, and the small buyers are less in evidence. There are good inquiries for some big lots, and a few sales of the same class. Current quotations on No. 2 foundry are $10@10.50, Birmingham—$13.75@14.25, St. Louis; the higher price being for late deliveries. Trade in finished iron and steel products is improving.

FOREIGN IRON TRADE

Canadian Production—Iron and steel production in Canada for the half year ended June 30, is reported as follows, in long tons:

	1910	1911	Changes
Pig iron	344,783	400,170	I. 55,387
Steel ingots	338,966	374,793	I. 35,827
Steel rails	161,635	174,592	I. 12,957

Finished steel, other than rails, is not reported.

German Iron Production—The German Iron and Steel Union reports pig-iron production in the German Empire in October at 1,334,931 tons, an increase of 84,239 tons over September. For the 10 months ended Oct. 31, the total was as follows, in metric tons:

	1910	1911	Changes
Foundry iron	2,415,026	2,520,116	I. 105,090
Forge iron	535,974	436,910	D. 99,064
Steel pig	1,119,316	1,434,666	I. 315,350
Bessemer pig	405,076	296,278	D. 108,798
Thomas(basic)pig	7,738,516	8,154,720	I. 416,204
Total	12,213,908	12,842,690	I. 628,782

Total increase this year, 5.1 per cent. Steel pig includes spiegeleisen, ferromanganese and all similar alloys.

United States Foreign Trade—Exports and imports of iron and steel and of machinery in the United States for the nine months ended Sept. 30, are valued as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1910	1911	Changes
Exports	$146,924,302	$185,118,660	I. $38,194,358
Imports	30,439,998	22,220,591	D. 8,219,407
Excess, exp.	$116,484,304	$162,898,069	I. $46,413,765

Increase in exports, 26 per cent.; decrease in imports, 27 per cent. The leading items of iron and steel were, in long tons:

	Exports 1910	Exports 1911	Imports 1910	Imports 1911
Pig iron	83,862	95,636	176,615	115,874
Scrap	16,867	67,601	65,457	14,371
Billets, blooms, etc.	14,162	181,178	36,026	23,245
Bars	93,848	107,596	31,211	20,840
Rails	263,782	349,942	....	.....
Sheets and plates	204,056	252,281	5,465	1,688
Structural steel	114,552	158,457	.....	.....
Wire-rods	16,897	12,830	15,780	12,129
Wire	122,385	158,601	.....	.....
Nails and spikes	45,062	53,026	.....	.....
Tinplates	8,395	42,557	53,803	12,769
Pipe and fittings	118,101	144,817	.....	.....

Imports of wire not reported in quantities; values were $1,167,015 in 1910, and $991,655 in 1911. Imports of rails and structural steel not reported separately. Exports of mining machinery were valued at $4,742,032 in 1910, and $5,143,394 this year.

METAL MARKETS

New York, Nov. 29—The metal markets are rather quieter this week, but recent advances seem to be maintained.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal	Exports	Imports	Excess
Gold:			
Oct. 1911	$3,983,994	$ 4,102,427	Imp.$ 118,433
" 1910	750,330	4,250,259	Imp. 3,499,929
Year 1911	22,247,304	49,279,533	Imp. 27,032,229
" 1910	56,068,411	49,932,386	Exp. 6,136,025
Silver:			
Oct. 1911	5,087,087	3,404,458	Exp. 1,682,629
" 1910	4,269,575	3,395,200	Exp. 874,375
Year 1911	54,615,048	37,100,888	Exp. 17,514,160
" 1910	46,034,318	36,652,464	Exp. 9,381,854

Exports from the port of New York, week ended Nov. 25: Gold, $1,833,109, chiefly to Argentina; silver, $1,801,858, principally to London. Imports: Gold, $153,113; silver, $105,551, largely from Mexico and South America.

Gold—Prices on the open market in London remained at the normal level, 77s. 9d. per oz. for bars and 76s. 4d. per oz. for American coin. Most of the supplies went to Egypt and the Bank of England. In New York $1,000,000 additional was reported taken for Canada, and $500,000 for Argentina.

Iridium—The price is given at $64 per oz. for pure metal.

Platinum—The market is again reported rather quiet, with no change. Dealers ask $46 per oz. for refined platinum, and $48.50 per oz. for hard metal.

Our Russian correspondent writes, under date of Nov. 9, that prices are firm and slightly advanced. The mines in the Urals are closed for the winter; but it is believed that the famine conditions in the southern Urals will tend to increase the number of *starateli*, or tributers going to work in the spring. Quotations for crude metal, 83 per cent. platinum, are 10.10 rubles per zolotnik at Ekaterinburg, and 39,000 rubles per pood at St. Petersburg—equal to $37.98 and $38.22 per oz., respectively.

Silver—The market for spot silver has relaxed somewhat, owing to gradual covering at maturity of time sales. There are no new features in the situation.

SILVER AND STERLING EXCHANGE

Nov.	23	24	25	27	28	29
New York	56⅜	55⅞	56⅛	55⅝	55⅝	55⅜
London	26⅛	25⅝	25⅞	25⅛	25⅛	25⅝
Sterling Ex.	4.8665	4.8660	4.8660	4.8655	4.8635	4.8620

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

Shipments of silver from London to the East, Jan. 1 to Nov. 16, reported by Messrs. Pixley & Abell:

	1910	1911	Changes
India	£6,140,000	£7,722,600	I. £1,582,600
China	1,218,500	990,300	D. 228,200
Total	£7,358,500	£8,712,900	I. £1,354,400

India Council bills in London averaged 16.04d. per rupee for the week.

The United States Mint has bought 200,000 oz. for coinage, the first purchase for several months.

Copper, Tin, Lead and Zinc

NEW YORK

Nov.	Copper Lake, Cts. per lb.	Copper Electrolytic, Cts. per lb.	Tin Cts. per lb.	Lead New York, Cts. per lb.	Lead St. Louis, Cts. per lb.	Zinc New York, Cts. per lb.	Zinc St. Louis, Cts. per lb.
23	13 @13¼	12.85 @12.95	43¾	4.35	4.20 @4.25	6.45 @6.65	6.30 @6.50
24	13 @13¼	12.90 @13.00	44¼	4.35	4.20 @4.25	6.45 @6.65	6.30 @6.50
25	13⅛ @13¼	13.00 @13.10	44½	4.35	4.20 @4.25	6.45 @6.65	6.30 @6.50
27	13.25 @13.30	13.05 @13.10	45⅜	4.45	4.30 @4.35	6.45 @6.65	6.30 @6.50
28	13.25 @13.30	13.05 @13.10	44½	4.45	4.30 @4.35	6.45 @6.65	6.30 @6.50
29	13.25 @13.30	13.05 @13.10	44⅝	4.45	4.30 @4.35	6.45 @6.65	6.30 @6.50

The quotations for copper, lead, spelter and tin are for wholesale contracts with consumers, without distinction as to deliveries; and are representative, as nearly as possible, of the bulk of the transactions, reduced to basis of New York, cash, except where St. Louis is specified as the basing point. The quotations for electrolytic copper are for cakes, ingots and wirebars. 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.

LONDON

Nov.	Copper Spot	Copper 3 Mos	Copper Best Sel'td	Tin Spot	Tin 3 Mos	Lead, Spanish	Zinc, Ordinaries
23	58⅛	59¼	62¾	198⅛	188¼	15 1/16	26⅞
24	59 1/16	59 1/16	63¼	201	189¼	15⅞	26⅞
25	.....	.....	.....	.....	.....	.....	.....
27	59¼	60	63¼	202½	191	15⅞	26⅞
28	58 15/16	59 1/16	63¼	201⅜	190⅛	15⅞	27
29	58 15/16	59 1/16	63¼	201¾	192⅛	15⅞	27

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17½c.; £12 = 2.61c.; £23 = 5c.; £60 = 13.40c. ± £1 = ± 0.21¾c.

Copper—A large volume of business was done during the week of Nov. 23-29, the major part being for export, but on the 27th a little slackening in the demand from abroad became manifest. The larger part of the business was for January delivery, but February contracts have been freely made. Several of the agencies having completely disposed of their available supplies up to the end of December and also having sold liberally for January, the market has been especially dominated by the interest which has been carrying the major part of the electrolytic surplus, and this advanced the price first to 13⅛c. and then to 13¼c., delivered, usual terms, sales being made upon those

terms. A little shading was done by one or two small interests on near-by and January copper, and on Nov. 29 some speculative holdings were reported as being offered at material concessions, but these offerings were without particular significance. Domestic consumers have followed the advance reluctantly, buying no more metal than compelled to. This attitude is possibly reflected in the comparative dullness in the market for Lake copper, which, although advanced in price, shows none of the activity that characterizes electrolytic. Some sales of prime Lake were made at 13¼c., and the asking price for the leading brands has been raised to 13⅜c., but we have not yet heard of any sales at the latter figure. The close is firm at 13.25 to 13.30c. for lake; 13.05 to 13.10c. for electrolytic in cakes, wirebars or ingots. Casting copper is quoted nominally at 12⅝ to 12⅞c. as an average for the week.

The standard market has been very active, and a large business was transacted from day to day at advancing quotations. The high point was reached last Monday, when the three months' quotation touched £60. Since then the tendency has been somewhat easier, and the close is quiet at £58 18s. 9d. for spot and £59 13s. 9d. for three months.

Copper sheets have been advanced ½c., and are now 18½@19½c. base, for large lots. Full extras are charged and higher prices for small quantities. Copper wire has again been advanced, to 14¼c. base, carload lots at mill.

Copper exports from New York for the week were 3919 long tons. Our special correspondent gives the exports from Baltimore at 978 tons.

Imports of copper into France, 10 months ended Oct. 31, were 104,863,360 lb. in 1910, and 110,093,760 lb. in 1911; increase, 5,230,400 lb. Of the imports this year 84,712,320 lb. were from the United States.

Brass Prices—The Ansonia Brass Company announces the following prices, effective Nov. 27: Sheets, high brass 14⅞c. net per lb.; low brass, 16⅜c. wire, 14⅝c. high brass; 16⅜c. low brass. Rods, 14⅝c. high brass; 17⅛c. low brass. Tubing, brazed, 19½c.; open seam, 18⅛c. Scrap allowances are 9⅜c. net per lb. for high brass, and 10⅜c. for low brass.

Tin—Considerable orders from this side were placed in the London market, with the result that quotations advanced vigorously. A feature of this business was the liberal buying for future deliveries.

In this market the spot quotation is again becoming serious. There will be no arrivals for the next ten days, and meanwhile stocks in the hands of dealers here are held at a premium of about ½ to ¾c. over the import price.

The close is cabled as very firm at £201 15s. for spot and £192 10s. for three months, while December tin can be purchased at about 44⅝c. per lb. in New York.

Lead—A further advance of $2 per ton in the price of the leading interests was quickly followed by outside sellers, and the market is now established at 4.45c., New York, and 4.30@4.35c., St. Louis.

There has been no change in the London market, which has remained steady at £15 17s. 6d. for Spanish, and £16 for English lead.

Spelter—Spelter available for December delivery has practically ceased to exist. Carloads that are occasionally scraped up fetch fancy premiums from belated buyers. As high as 6⅞c., St. Louis, is said to have been paid. Some smelters have sold out all their January spelter, but this delivery is still to be had freely from other producers. Some fair tonnages for this and February contracts have been placed during the week at 6.30@6.50c., the largest consumer having been in the market. Smelters seem to be anxious to place February and later deliveries at material concessions. On the whole, the market has been rather quiet. Consumers appear to have filled their urgent wants, and the fancy quotations, which are named for near-by shipments, are largely nominal. The close is steady at 6.45@6.65c., New York, and 6.30@6.50c., St. Louis.

The London market was put up further 2s. 6d. on November 28, the close being cabled as £27 for good ordinaries and £27 5s. for specials.

Base price of zinc sheets has again been advanced ¼c., and from Nov. 24 is $8.50 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

Zinc dust is quoted at 7⅜@7½c. per lb., New York.

Other Metals

Aluminum—Business is a little more active. Quotations are 18¾@19c. for No. 1 ingots, New York. The foreign markets are reported firmer, with some advances in prices.

Antimony—Business remains quiet, and quotations are again a shade lower. Cookson's is quoted at 7¾@7⅞c. per lb.; Hallett's at 7⅜@7⅝c.; while 6¾@6⅞c. is named for Hungarian, Chinese and other outside brands.

Quicksilver—Business is steady and prices are unchanged. New York quotation is $45 per flask of 75 lb., with the usual advance for small quantities. San Francisco, $44.50 for domestic orders and $42 for export. London price is £8 10s. per flask, with £8 7s. 6d. quoted by second hands.

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

British Metal Imports and Exports

Imports and exports of metals in Great Britain, 10 months ended Oct. 31, figures in long tons, except quicksilver, which is in pounds:

Metals	Imports	Exports	Excess	
Copper, long tons	120,763	62,819	Imp.	57,944
Copper, 1910 ...	106,888	69,028	Imp.	37,860
Tin, long tons....	38,040	38,619	Exp.	579
Tin, 1910.....	37,266	36,206	Imp.	1,060
Lead, long tons..	180,743	37,081	Imp.	143,662
Lead, 1910	184,925	40,480	Imp.	144,445
Spelter, l'g tons..	110,365	8,062	Imp.	102,303
Spelter, 1910....	110,835	7,530	Imp.	103,305
Quicksilver, lb...	3,369,757	2,061,779	Imp.	1,307,978
Quicksilver, '10	3,279,640	1,495,022	Imp.	1,784,618
Minor met's, tons	4,938	18,684	Exp.	13,746
Minor, 1910.....	4,240	19,016	Exp.	14,596
Ores				
Tin ore and con.	24,849	.....	Imp.	24,849
Tin ore, 1910...	21,825	.....	Imp.	21,825
Pyrites	731,925	.....	Imp.	731,925
Pyrites, 1910...	669,288	.....	Imp.	669,288

Copper totals include metallic contents of ore and matte. Exports include reexports of foreign material. Miscellaneous metals include nickel, aluminum and the minor metals and alloys. Of the imports in 1911, the United States furnished in all 44,035 tons fine copper, and 34,878 tons lead. This lead was chiefly Mexican, refined in this country.

Zinc and Lead Ore Markets

Platteville, Wis., Nov. 25—The highest price paid this week for zinc ore was $46.50; the base price, 60 per cent. zinc, was $45@46. The base price paid for 80 per cent. lead ore was $53@54 per ton.

SHIPMENTS, WEEK ENDED NOV. 25

Camps	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Galena.....	746,300	.....	.....
Hazel Green.....	456,000	.....	.....
Platteville	425,200	.....	.....
Benton.....	401,300	65,430	339,000
Cuba City.....	319,980	.....	141,000
Mineral Point.....	311,800	.....	.....
Harker.....	213,760	.....	.....
Highland.....	185,300	.....	.....
Rewey.....	80,000	.....	.....
Linden.....	.....	.....	220,270
Total.....	3,139,640	65,430	700,270
Year to date.....	138,331,489	8,046,265	26,455,240

Shipped during week to separating plants, 2,114,540 lb. zinc ore.

Joplin, Mo., Nov. 25—The high price of sulphide ore was $50; the base per ton of 60 per cent. zinc, $47@48. Zinc silicate sold on a base of $25@27 per ton of 40 per cent. zinc. The average price, all grades of zinc, was $43.90. The contract base price was $49.50. Lead ore sold as high as $62 per ton, the competition since the advent of the St. Louis Smelting and Refining Company into the market having become quite pronounced. The average price, all grades of lead, was $57.94 per ton.

The zinc shipment this week was 1109 tons less than last week and 1500 tons less than the previous week. The shipment of 4736 tons is extremely low for the excellent prices prevailing for this mineral. It is partially accounted for in the withholding from market of a portion of the tonnage for a higher price, and an intimation received here that ad-

ditional smelters were contracting ore in the West. The low shipment has added at least 1000 tons to the bin stock in the district.

SHIPMENTS, WEEK ENDED NOV. 25

	Blende	Calamine	Lead Ore	Value
Webb City-Carterville	3,375,890	.....	1,210,770	$111,673
Joplin	2,060,260	.....	230,280	54,179
Galena	547,720	.....	141,150	16,385
Duenweg	635,560	.....	.....	14,300
Cave Springs	560,650	.....	23,540	14,135
Oronogo	519,880	.....	47,510	11,983
Jackson	205,970	.....	175,960	9,810
Alba-Neck	258,790	.....	.....	5,951
Spurgeon	189,100	43,350	30,110	5,175
Granby	57,110	147,680	95,670	4,560
Miami	85,320	.....	87,650	3,757
Carl Junction	135,600	.....	.....	3,390
Aurora	131,630	.....	.....	2,895
Quapaw	193,080	.....	.....	2,851
Carthage	52,200	63,110	.....	1,947
Badger	65,900	.....	15,520	1,900
Saginaw	.....	80,000	19,420	1,840
Lawton	64,110	.....	.....	1,410
Totals	9,138,770	334,140	2,077,580	$268,151

11 mos	452,024,920	33,029,650	81,960,530	$11,073,803

Blende val., the week, $204,019; 11 mos., $9,140,573
Calamine, the week, 3,936; 11 mos., 503,072
Lead value, the week, 60,196; 11 mos., $2,329,158

MONTHLY AVERAGE PRICES

Month	Zinc Ore: Base Price		Zinc Ore: All Ores		Lead Ore: All Ores	
	1910	1911	1910	1911	1910	1911
January	$47.31	$41.85	$45.16	$40.55	$56.99	$55.68
February	40.69	40.21	39.47	39.16	53.64	54.46
March	43.60	39.85	39.71	38.45	51.26	54.57
April	41.00	38.88	39.33	37.47	49.72	56.37
May	40.19	38.25	37.51	36.79	48.16	55.21
June	40.20	40.50	37.83	38.18	48.80	56.49
July	39.63	40.75	36.80	38.36	48.59	58.81
August	40.13	42.50	37.32	41.28	49.75	60.74
September	43.45	42.63	39.96	41.29	54.73	59.33
October	43.31	42.38	40.50	40.89	53.18	54.72
November	47.20	.....	43.20	.....	54.80	.....
December	42.50	.....	40.70	.....	55.70	.....
Year	$42.43	.....	$39.79	.....	$52.12	.....

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.

New Caledonia Ores

Exports of ores from New Caledonia, nine months ended Sept. 30, are reported by the *Bulletin du Commerce*, of Noumea, at 83,093 metric tons of nickel ore and 32,587 tons chrome ore. Exports of metals were 964 tons nickel matte and 505 tons copper matte.

CHEMICALS

New York, Nov. 29—The general markets continue steady, but with no changes of importance.

Copper Sulphate—A fair business is being done and prices are unchanged. Quotations are $4.50 per 100 lb. for carload lots and $4.75 per 100 lb. for smaller orders.

Arsenic—Business is on a moderate scale, and prices are a shade easier. White arsenic can be had at $2.25 per 100 lb. For the first time in several years Cornish arsenic is being offered for sale here.

Nitrate of Soda—Business is quieter, though the market is fairly firm. Prices have eased off a little from last quotations, 2.20c. per lb. being named for both spot and future positions.

Petroleum

Production of petroleum in California in September was 7,291,254 bbl.; deliveries, 6,369,518 bbl. Stocks reported were 40,758,837 bbl. at the close of the month.

Exports of mineral oils from the United States, 10 months ended Oct. 31, in gallons:

	1910	1911
Crude petroleum	95,691,231	96,782,047
Naphthas	64,538,762	95,383,826
Illuminating oils	779,412,904	944,912,912
Lubricating and paraffin	132,493,465	143,866,188
Residuum	90,580,466	95,486,552
Total	1,162,716,828	1,376,431,525

The total increase this year was 213,714,697 gal., or 19.2 per cent.

MINING·STOCKS $

New York, Nov. 29—The general stock market has had a moderately strong tone, with occasional recessions. Upon the whole, quotations have improved in some degree, though the fluctuations have not been large, and dealings have not been heavy. The tendency is to some improvement.

On the Curb mining stocks were a little more active, though dealings were not on a very large scale, except for a few stocks. The Cobalt shares about hold their own, and some interest was manifested in Porcupine. Copper stocks furnished most of the business, and several issues were prominent. The leading stocks of this class were Braden, Giroux, Inspiration and Greene-Cananea. The movement was rather irregular, showing both advances and recessions. Yukon Gold recorded more transactions than for some time past.

Boston, Nov. 27—The mining-share market has broadened out considerably and has been particularly buoyant the last week. Advances have extended from $1 to $10, the latter being the St. Mary's Mineral Land Company's shares, which reached $55. While prices have risen rapidly there has been a fair amount of profit taking, which has prevented a runaway market. Ahmeek on the Curb recorded a $22 advance to $212 per share on small-lot trading.

Advances are so general that it is hardly worth while to name them. There has been a noteworthy increase in commission-house orders, many of them coming from Michigan. Live Oak is up $5.25 to $31 on reports that John D. Ryan has purchased a controlling interest in that property at $30 per share. Negotiations are also on for a consolidation with the Miami, in which event the Keystone property would be included.

Isle Royale is particularly strong, advancing $4.75 to $21.50. There has been persistent buying of this stock. Arizona Commercial, after touching 10c., quickly came back to 40c. The bonds are quoted around 40. The protective committee will now push through the reorganization,

COPPER PRODUCTION REPORTS.

Copper contents of blister copper, in pounds.

Company	August	Sept.	October
Alaska shipments	2,095,690	2,807,240	.....
Anaconda	22,500,000	21,565,800	21,400,000
Arizona, Ltd.	2,720,000	2,544,000	2,720,000
Balaklala	.....	.....	.....
Copper Queen	7,006,097	6,546,540	7,786,218
Calumet & Ariz.	4,650,000	4,198,000	4,784,000
Detroit	2,080,100	1,864,050	2,086,624
East Butte	854,000	1,134,000	920,000
Mammoth	.....	.....	.....
Nevada Con.	5,249,515	5,328,983	5,547,931
Old Dominion	1,982,000	2,032,000	.....
Shannon	1,442,560	1,550,080	1,124,000
South Utah	269,545	266,000	.....
United Verde*	2,500,000	2,750,000	2,750,000
Utah Copper Co.	9,010,669	9,285,381	8,660,729
Lake Superior*	19,000,000	18,500,000	18,440,000
Non-rep. mines*	17,100,000	16,500,000	17,500,000
Total production	98,460,177	96,872,674	.....
Imports, bars, etc.	22,798,151	26,679,736	.....
Total blister	121,258,328	123,552,410	.....
Imp. in ore & matte	9,821,942	6,408,799	.....
Total	131,080,270	129,961,209	.....
Brit. Col. Cos.:			
British Col. Copper	736,515	875,023	778,586
Granby	.....	.....	.....
Mexican Cos.:			
Boleo	2,149,028	2,094,400	1,245,440
Cananea	.....	.....	5,804,000
Moctezuma	2,263,707	2,112,683	1,719,643
Other Foreign:			
Cape Cop., S. Africa	.....	.....	.....
Spassky, Russia	649,600	759,360	.....
Exports from:			
Chile	4,032,000	4,816,000	4,816,000
Australia	7,392,000	6,496,000	7,056,000

Figures are reports received from companies, unless otherwise stated. Boleo copper does not come to American refiners.
*Estimated.

STATISTICS OF COPPER

Month	United States Product'n.	Deliveries, Domestic.	Deliveries for Export
X, 1910	126,469,284	67,814,172	68,186,912
XI	119,353,463	60,801,992	67,424,316
XII	123,339,219	43,594,018	88,104,075
Year 1910	1,452,122,120	749,426,542	722,431,494
I, 1911	115,696,591	42,078,567	53,208,739
II	109,828,297	50,518,998	45,111,019
III	130,532,080	66,080,789	59,081,127
IV	118,085,223	52,407,650	62,129,599
V	126,962,544	64,543,963	61,978,557
VI	124,554,312	61,655,561	71,460,519
VII	112,167,934	56,982,582	74,880,658
VIII	125,493,667	59,93o,364	69,855,660
IX	115,588,950	57,311,584	50,824,011
X	118,255,442	64,068,307	60,084,349

	Visible Stocks: United States.	Europe.	Total.
XI, 1910	139,261,914	198,060,800	337,322,711
XII	130,389,069	193,200,000	323,589,095
I, 1911	122,030,195	236,629,120	358,649,373
II	142,439,490	236,992,000	379,431,134
III	156,637,770	233,385,600	390,023,009
IV	162,007,934	223,014,400	385,022,434
V	165,555,908	212,284,800	377,840,708
VI	165,995,932	202,540,800	368,536,732
VII	157,434,164	195,932,800	353,366,964
VIII	137,738,858	191,891,840	329,630,698
IX	133,441,501	191,228,800	324,670,301
X	140,894,856	191,945,600	332,840,456
XI	134,997,642	176,825,600	311,823,242

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. From Jan. 1, 1911, stocks at Hamburg and Rotterdam are included in the visible stocks for Europe.

although there is a report that a syndicate stands ready to bid $500,000 for the property at foreclosure.

Curb trading has also been active and buoyant, with but few exceptions. First National rose almost $1 per share.

Assessments

Company	Delinq	Sale	Amt
Andes, Nev.	Nov. 2	Nov. 28	$0.05
Best & Belcher, Nev.	Dec. 6	Dec. 29	0.05
Caledonia, Nev.	Dec. 11	Jan. 2	0.10
Cedar Talisman, Utah	Nov. 9	Nov. 28	0.005
Challenge, Nev.	Nov. 21	Dec. 12	0.05
Copper Mountain, Ida.	Nov. 1	Dec. 1	0.002
Corbin Copper, Mont.	Dec. 11		1.00
Eureka-Swansea Ex., Utah.	Dec. 14		0.01
Hider-Nevada, Nev.	Nov. 4	Nov. 25	0.001½
Kinsley Development, Utah	Nov. 20	Dec. 11	0.C02
New York-Bonanza, Utah.	Nov. 7	Nov. 28	0.02
Ojibway, Mich.	Jan. 10		1.00
Opex, Utah	Dec. 13		0.01
Pioche Metals, Utah.	Nov. 20	Dec. 11	0.005
Rainbow, Utah.	Dec. 1	Dec. 20	0.002½
Raven, Mont.	Feb. 1		0.10
San Antonia, Mex.	Nov. 20		0.50
Savage, Nev.	Nov. 23	Dec. 14	0.10
Seg. Belcher, Nev.	Nov. 2	Nov. 27	0.05
Sierra Nevada, Nev.	Oct. 28	Nov. 21	0.10
Superior & Boston, Ariz.	Oct. 16		0.50
Swansea, Utah.	Nov. 13		0.01
Union Con., Nev.	Nov. 27	Dec. 19	0.15
Utah Con. M. & M., Utah.	Dec. 20		0.002½
Utah Con. Tintic, Utah.	Dec. 7		0.01
Victoria, Mich.	Aug. 21		1.00
Winona, Mich.	Nov. 10		1.00
Wyandot, Mich.	Dec. 14		1.00

Monthly Average Prices of Metals

SILVER

Month	New York			London		
	1909.	1910.	1911.	1909.	1910.	1911.
January	51.750	52.375	53.795	23.843	24.154	24.865
February	51.472	51.534	52.222	23.706	23.794	24.081
March	50.468	51.454	52.745	23.227	23.690	24.324
April	51.428	53.221	53.325	23.708	24.483	24.595
May	52.905	53.870	53.308	24.343	24.797	24.583
June	52.538	53.462	53.043	24.166	24.651	24.486
July	51.043	54.150	52.630	23.519	25.034	24.286
August	51.125	52.912	52.171	23.588	24.428	24.082
September	51.440	53.295	52.440	23.743	24.567	24.209
October	50.923	55.490	53.340	23.502	25.596	24.594
November	50.703	55.635	55.719	23.351	25.680	
December	52.226	54.428		24.030	25.160	
Total	51.502	53.486		23.706	24.670	

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

COPPER

	New York				London, Standard	
	Electrolytic		Lake			
	1910.	1911.	1910.	1911.	1910.	1911.
January	13.620	12.295	13.870	12.680	60.923	55.604
February	13.332	12.256	13.719	12.611	59.388	54.970
March	13.255	12.139	13.586	12.447	59.214	54.704
April	12.733	12.019	13.091	12.275	57.238	54.035
May	12.550	11.989	12.885	12.214	56.313	54.313
June	12.404	12.385	12.798	12.611	55.310	56.368
July	12.215	12.463	12.570	12.720	54.194	56.670
August	12.490	12.405	12.715	12.634	55.733	56.264
September	12.379	12.201	12.668	12.508	55.207	55.253
October	12.553	12.189	12.788	12.370	56.722	55.176
November	12.742	12.616	12.914	12.769	57.634	
December	12.581		12.863		56.769	
Year	12.738		13.039		57.054	

New York, cents per pound, London, pounds sterling per long ton of standard copper.

TIN AT NEW YORK

Month	1910.	1911.	Month	1910.	1911.
January	32.700	41.255	July	32.695	42.400
February	32.920	41 614	August	33.972	43 319
March	32.403	40.157	September	34.982	39 755
April	32.976	42 185	October	36.190	41.185
May	35.125	43.115	November	36.547	
June	32.769	44.606	December	38.199	
			Av. Year	34.123	

Prices are in cents per pound.

LEAD

Mohth	New York		St. Louis		London	
	1910.	1911.	1910.	1911.	1910.	1911.
January	4.700	4.483	4.582	4.334	13.650	13.009
February	4.613	4.440	4.445	4.266	13.328	13.043
March	4.459	4.394	4.307	4.238	13.063	13.122
April	4.376	4.412	4.225	4.262	12.641	12.889
May	4.315	4.373	4.164	4.223	12.550	12.984
June	4.343	4.435	4.207	4.292	12.688	13.260
July	4.404	4.499	4.291	4.397	12.531	13.530
August	4.400	4.500	4.290	4.406	12.513	14.026
September	4.400	4.485	4.289	4.356	12.582	14.744
October	4.400	4.265	4.271	4.139	13.091	15.332
November	4.442	4.298	4.314	4.181	13.217	
December	4.500		4.363		13.197	
Year	4.446		4.312		12.920	

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month	New York		St. Louis		London	
	1910.	1911.	1910.	1911.	1910.	1911.
January	6.101	5.452	5.951	5.302	23.350	23.887
February	5.569	5.518	5.419	5.368	23.188	23.276
March	5.637	5.563	5.487	5.413	23.031	23.016
April	5.439	5.399	5.289	5.249	22.469	23.743
May	5.191	5.348	5.041	5.198	22.100	24.375
June	5.128	5.520	4.978	5.370	22.094	24.612
July	5.152	5.695	5.002	5.545	22.406	25.006
August	5.279	5.953	5.129	5.803	22.800	26.801
September	5.514	5.869	5.364	5.719	23.165	27.750
October	5.628	6.102	5.478	5.951	23.900	27.256
November	5.976	6.380	5.826	6.223	24.083	
December	5.624		5.474		24.019	
Year	5.520		5.370		23 050	

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PIG IRON AT PITTSBURG

	Bessemer		Basic		No. 2 Foundry	
	1910	1911	1910	1911	1910	1911
January	$19.90	$15.90	$17.98	$14.40	$17.94	$14.75
February	18.96	15.90	17.21	14.50	17.38	14.81
March	18.53	15.90	16.93	14.65	17.00	14.96
April	18.28	15.90	16.84	14.65	16.75	15.00
May	17.10	15.90	15.94	14.30	16.18	14.72
June	16.52	15.90	15.60	14.06	15.53	14.56
July	16.40	15.90	15.40	14.03	15.40	14.53
August	16.09	15.90	14.89	14.00	15.16	14.47
September	15.92	15.90	14.73	13.57	14.93	14.40
October	15.90	15.43	14.05	13.44	14.88	14.34
November	15.84	15.15	14.26	13.30	14.78	14.25
December	15.90		14.15		14.65	
Year	$17.10		$15.65		$15.83	

STOCK QUOTATIONS

COLO. SPRINGS Nov. 28

Name of Comp.	Bid.
Acacia	.03
Cripple Cr'k Con.	.02
C. K. & N.	.12
Doctor Jack Pot.	.07
Elkton Con.	.73
El Paso	.73½
Findlay	.05
Gold Dollar	‡.17
Gold Sovereign	.02
Isabella	.13
Jack Pot	‡.07
Jennie Sample	.07
Lexington	.01
Moon Anchor	.02
Old Gold	‡.04
Mary McKinney	.50
Pharmacist	.02
Portland	.98
Vindicator	.72
Work	.02

SALT LAKE Nov. 28

Name of Comp.	Bid.
Beck Tunnel	.19
Black Jack	.10½
Carisa	.17
Cedar Talisman	.03
Colorado Mining	.29½
Columbus Con.	‡.28
Daly Judge	‡4.12½
Grand Central	.82
Iron Blossom	1.02½
Little Bell	.35
Lower Mammoth	.02½
Mason Valley	9.00
May Day	.11½
Nevada Hills	2.55
New York	‡.05
Prince Con	.83
Silver King Coal'n	1.60
Sioux Con.	.12½
Uncle Sam	.25
Yankee	‡ 13

TORONTO Nov. 28

Name of Comp.	Bid	Name of Comp.	Bid
Coniagas	6.00	Pearl Lake	.45½
Hudson Bay	80.00	Porcu. Gold	.59
Temiskaming	.32½	Porcu. Tisdale	.05
Wettlaufer-Lor.	.83	Preston E. D.	.19½
Apex.	.11	West Dome	1.00½
Central	3.70	Standard	.15½
Dobie	.95	Foley O'Brien	.63
Dome Exten	.69½	Rea	3.31
Hollinger	11.73	Coronation	‡.03
Imperial	.08½	Swastika	.29½

SAN FRANCISCO Nov. 28

Name of Comp.	Clg.	Name of Comp.	Bid
COMSTOCK STOCKS		MISC. NEV. & CAL.	
Alta	.05	Belmont	8.10
Belcher	.60	Jim Butler	.23
Best & Belcher	.12	MacNamara	.25
Caledonia	.85	Midway	.23
Challenge Con.	.19	Mont.-Tonopah	.90
Chollar	.11	North Star	.30
Confidence	.50	West End Con.	.72
Con. Virginia	.66	Atlanta	.16
Crown Point	.85	Booth	.09
Gould & Curry	.08	C.O.D. Con.	.14
Hale & Norcross	.16	Comb. Frac.	.15
Mexican	3.60	Jumbo Extension	.22
Occidental	.50	Pitts.-Silver Peak	1.12½
Ophir	1.60	Silver Pick	.07
Overman	.80	St. Ives	.35
Potosi	.14	Tramps Con.	.02
Savage	.26	Argonaut	‡2.50
Sierra Nevada	.42	Bunker Hill	3.00
Union Con.	1.45	Cent. Eureka	‡.42
Yellow Jacket	.70	So. Eureka	‡6.00

N. Y. EXCH. Nov. 28

Name of Comp.	Clg.
Amalgamated	64
Am. Agri. Chem.	55
Am.Sm.&Ref.,com	74
Am. Sm.& Ref., pf.	103¼
Anaconda	39
Batopilas Min.	1⅝
BethlehemSteel pf	57
Chino	23⅞
Comstock Tunnel	‡.19
Federal M.& S., pf.	46¼
Goldfield Con.	4½
Great Nor., ore ctf.	42⅜
Homestake	85
Miami Copper	22½
Nat'nalLead,com.	50½
National Lead, pf.	105¼
Nev. Consol	18⅜
Pittsburg Coal, pf.	84⅜
Ray Con.	15⅜
RepublicI.&S.com.	23
Republic I & S, pf.	82⅞
SlossSheff'd,com.	42
Sloss Sheffield, pf.	110
Tennessee Copper	38⅛
Utah Copper	51
U. S. Steel, com.	64⅞
U. S. Steel, pf.	109¼
Va. Car. Chem.	54⅛

N. Y. CURB Nov. 28

Name of Comp.	Clg.
Barnes King	‡.25
Beaver Con.	.43
Braden Copper	5½
B. C. Copper	4⅜
Buffalo Mines	1.50
Butte & Vipond	.53
Butte Coalition	17
Cobalt Central	.01
Con. Ariz. Sm.	⅜
Davis-Daly	1
Ely Con	⅜
Florence	.75
Giroux	4⅜
Gold Hill Con.	1/16
Greene Cananea	8⅜
Greenwater	.05
Guanajuato	‡3⅜
Guerrero	‡1⅛
Guggen. Exp.	170
Inspiration	8⅞
Internat. S. & R.	‡124
Kerr Lake	3
La Rose	3½
McKinley-Dar-Sa.	1⅛
Min. Co. of A. new	4
Nev. Utah M. & S.	1/16
Nipissing Mines	7¾
Ohio Copper	1¾
Pacific Sm. & M.	1/16
Precious Metals	‡1⅜
Ray Central	2
Red Warrior	‡1½
South Utah M. & S.	1/16
Standard Oil (Old)	625
Stand'd Oil of N.J.	340
Stand'd Oil Subs.	325
Stewart	.69
Tonopah	7⅛
Tonopah Ex.	1⅛
Tri-Bullion	1/16
Tularosa	‡⅛
Union Mines	‡⅛
Yukon Gold	3/16

LONDON Nov. 29

Name of Com.	Clg.
Camp Bird	£1 10s 6d
Dolores	1 10 0
El Oro	1 2 6
Esperanza	1 11 3
Mexico Mines	7 13 9
Oroville	0 5 6
Stratton'sInd.	0 2 0
Tomboy	1 3 9

BOSTON EXCH. Nov. 28

Name of Comp.	Clg.
Adventure	5
Algomah	4
Allouez	34½
Am. Zinc	26
Arcadian	‡2
Arizona Com.	.25
Atlantic	‡6
Bonanza	‡.35
Boston & Corbin	6¾
Butte & Balak	4
Calumet & Ariz.	56⅞
Calumet & Hecla	400
Centennial	12⅝
Con. Mercur	‡.03
Copper Range	55
Daly-West	‡5⅛
East Butte	11⅞
Franklin	8⅝
Granby	31
Hancock	21
Hedley Gold	‡14⅛
Helvetia	1⅝
Indiana	11
Isle Royale	20⅛
Keweenaw	.70
Lake	34
La Salle	4½
Live Oak	30½
Mass	‡7⅝
Michigan	2⅜
Mohawk	47
New Arcadian	‡2
North Butte	21½
North Lake	6
Ojibway	4⅛
Old Dominion	‡47
Osceola	98
Parrot	‡10
Quincy	67
Shannon	10
Shattuck-Ariz.	16⅛
Superior	26
Superior & Bost.	3⅛
Tamarack	26
Trinity	4½
Tuolumne	3⅛
U. S. Smelting	35
U. S. Smelt'g, pf.	47⅛
Utah Apex	2⅝
Utah Con.	15⅝
Victoria	2⅝
Winona	5⅛
Wolverine	90
Wyandot	.40

BOSTON CURB Nov. 28

Name of Comp.	Last
Ahmeek	205
Bingham Mines	1¼
Boston Ely	.95
Boswyocolo	.11
Cactus	.31
Calaveras	.75
United Verde Ext.	.92
Chief Cons	.65
Corbin	1⅛
Cortez	1⅛
Crown Reserve	21½
First Nat. Cop.	1½
Majestic	.40
Mazatan	‡.35
Moneta Porc.	‡.10
Nat'l Mine & Ex.	‡.09
Nevada-Douglas	3
New Baltic	4½
Oneco	1⅛
Raven Copper	.21
Rhode Island Coal	1⅜
San Antonio	‡3½
South Lake	6
Trethewey	.55
United Zinc, pfd.	‡2
Vulture	‡5.00
Yuma	‡.02

‡Last quotation.