

Issued Weekly by the
Hill Publishing Company

JOHN A. HILL, Pres. and Treas. DON'T McKEAS, 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.

The Engineering and Mining Journal

Vol. 92.

OCTOBER 28, 1911.

No. 18.

The Hill Iron Ore Leases

The announced determination of the Steel Corporation to give notice on Jan. 1 next of the cancellation of the Hill or Great Northern leases is an interesting matter, although its effect will not be immediate, since three years' notice is required by the terms of the lease, and it will therefore hold until Jan. 1, 1915. The lease, which was agreed upon in 1906, and went into effect Jan. 1, 1907, was the largest transaction of the kind ever concluded, covering an area of 39,280 acres of land, variously estimated to contain from 175,000,000 to 500,000,000 tons of iron ore. Although a great deal of prospecting work has been done since then, it is difficult to say how much ore is really available; but the quantity is somewhere between the extreme estimates. Even the lowest of them covers an important part of our future reserves.

Full comment was made upon the onerous terms of the lease at the time it was concluded. The rate for the first year was \$1.65 per ton; this, however, including 80c. for freight to Superior, shipment of all ore being required over the Great Northern railroad. The actual royalty to be paid was, therefore, 85c. per ton for the first year, increasing by 3.4c. each year. The minimum requirement was very high, 750,000 tons the first year, increasing by 750,000 tons each year until 8,250,000 tons should be reached. In 1910, therefore, the lessee was required to pay 95.2c. per ton royalty plus 80c. freight—\$1.752 per ton in all—on a minimum of 3,000,000 tons. There were some allowances, however; the royalty was based on an ore content of 59 per cent. natural iron, and a rebate of 4.82c. was allowed for each 1 per cent. of iron above or below that base. It is not possible here, however, to enter in detail into the somewhat complicated terms of the lease. It is sufficient to say that performance so far has been far below the minimum fixed by the lease. The Steel Corporation has spent a large sum in testing and exploring, but has done

comparatively little actual mining. No shipments from mines on the lease were made in 1907 and 1908; in 1909 only the trifling quantity of 6857 tons; and in 1910 a total of 1,809,952 tons, or less than two-thirds of the minimum required. This year shipments have been pushed, though their full quantity is not yet known.

The general belief three years ago was that the lease was made because the Steel Corporation could not afford—or did not wish—to have so great a body of reserve ore open to acquisition by any possible rival interest. Since then conditions have changed, as our readers know, and the possession of this ore is now in some ways an embarrassment rather than an asset. To give it up may go some way to relieve its holder from the accusations of monopoly which are now a bugbear to large corporations.

To disregard political conditions and look only on the actual business side, it is not surprising that the lease should be surrendered. It may be recalled that it was entered into without enthusiasm in October, 1906, at a time when all prices were relatively high and profitable and the existing productive capacity was being strained to meet the demand. If the lease was undertaken to prevent iron and steel productive capacity from exceeding demand the result has clearly not been accomplished for there has been a great growth in productive capacity, while demand has not increased proportionately.

The really interesting feature is that the news has been allowed to come out at this time, and for this the suspicion that the making of the lease may be regarded as in restraint of trade is probably responsible. As a business proposition purely, the Steel Corporation should renounce the lease, for while it appeared to promise only a doubtful profit from the trade conditions under which it was made, the trade developments of the last five years have made it quite improbable that the operation could be profitable.

Whether or not an arrangement will be made for the Steel Corporation to con-

CIRCULATION STATEMENT

During 1910 we printed and circulated 526,500 copies of THE ENGINEERING AND MINING JOURNAL.

Our circulation for September, 1911, averaged 9,700 copies per issue.

October 7.....	11,000
October 14.....	9,500
October 21.....	9,500
October 28.....	9,500

None sent free regularly, no back numbers. Figures are live, net circulation.

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tinue mining from the developments already made will probably furnish a question for legal consideration. If the entire property is surrendered it is not probable that any extensive development will occur in the near future, by other interests, as the Lake Superior region as it stands can ship well in excess of 50,000,000 tons of ore in a season; but it is shipping not more than 35,000,000 tons this season, and has never shipped as much as 44,000,000 tons in a season.

It is not improbable that the Hill lands may be unworked for some time. However, three years must elapse before any new disposition can be made, and in that time there may be important changes.

The Silver Situation

After a long period of monotony and very small fluctuations in price, silver has at last shown a tendency to advance to a higher level. In part this is due to a better position with regard to the Indian crops, and to the fact that the early marketing of some of those crops has considerably reduced the currency reserves in that country. The Chinese situation is not clear. The serious nature which the rebellion in that country has assumed may be expected to disturb trade; but so far it has only resulted in an apparent determination to hold the known reserves of silver, and in checking the sales of the metal to India which have helped to keep down the price. China has not been a buyer, but it has almost ceased to be a seller, and it is not easy to predict how long this position will last.

The Potash Salts Question

The controversy over the potash salts question has ended, as was expected some time ago, in the entire success of the German syndicate. The American contracts, over which the trouble arose, are canceled, and the American buyers will have to pay the prices fixed by the syndicate. Moreover, the American companies will have to pay over \$500,000 to abrogate the contracts—besides heavy legal costs—and apparently receive in return only a permission granted to some of the mines they had tied up, to mine a small surplus over their fixed quota without paying the tax levied on extra production. The attempt to break the syndicate has wholly failed. Backed by the government it has succeeded in utilizing to the full the advantage held by

Germany in its monopoly of the potash-salt production. Probably the result will make little difference to the users of fertilizers; but the main profits will accrue to the German, not the American, combination. The attempt to induce our own Government to intervene in favor of the American buyers by threats of tariff reprisals failed, since it involved too many interests and was too uncertain of issue.

So far the attempt to find deposits of potash salts in this country has been without result. There have been reports of discoveries, but so far investigation has shown them to be without commercial value.

Lake Superior Iron Ore Rates

It is announced that the two Steel Corporation railroads in Minnesota—the Duluth & Iron Range and the Duluth, Missabe & Northern—will, before the end of the year, make an important reduction in their rates on iron ore to the Lake Superior ports. There has always been some complaint about these rates from independent shippers, but no appeal could be taken to the Interstate Commerce Commission, since both roads are wholly within the State of Minnesota.

The rates charged on iron ore on these roads—which are the only outlet for the mines, except for those on the western side of the Mesabi range that are reached by the Great Northern—have been 80c. per ton from all mines on the Mesabi, 90c. from the Tower district and \$1 from the Ely district on the Vermilion range. These rates approximate 1c. per ton-mile, on a traffic which can be cheaply handled. It is moved in long trains, with full carloads and the grades, with very slight exceptions are all in favor of the traffic. The other business is of such small amount that it does not interfere with the ore traffic. There is no doubt that the railroads, considered by themselves, have been extremely profitable. The proposed reduction, which is to be to 60c. per ton from all ranges to the Lake Superior docks, will still leave what must be considered a high rate, in view of the quantity and conditions of the traffic. The old rate of 80c. for carrying the ore over distances varying from 80 to 120 miles to the docks was 10c. higher than that which has been charged for the last two or three seasons for moving it from Duluth, Superior or Two Harbors

to the Lake Erie ports, a distance of about 900 miles. Water rates are naturally lower than rail rates; but the contrast between 1c. and 0.077 cent per ton-mile is rather a striking one.

The reduction will, of course, accrue to the benefit of the independent steel companies which operate mines, and to the mine operators who sell their ore. To the Steel Corporation the difference will be only in accounting, since any apparent reduction in the cost of its ore, will be balanced by the decrease in the profits of its railroads, which contribute to its net earnings. Roughly speaking, the reduction of 20c. on ore freights will mean to the outsiders a decrease of 10 to 12c. per ton of pig iron; which is worth considering in a period of low prices.

The reduction is spoken of as voluntary; but it is undoubtedly a part of the plan to meet and avoid the charges of monopoly which have been made against the Steel Corporation. In that light it must be considered rather an adroit move, although the motive is so plain.

Trade and Money

The week has not brought with it much news that may be taken as directly affecting the general course of business. The evident determination of the Steel Corporation to square itself with the law, and to clear itself of charges of monopoly is commented upon elsewhere.

Pessimists may be inclined to consider the fact that New York is lending money to Paris and Berlin an unfavorable symptom, in that it may indicate a surplus of money which bankers hesitate to invest in new enterprises here under present conditions. Another way of looking at it is that political and industrial factors in Europe have brought about a demand for money and credits which offer for the time being higher interest rates; and this induces the movement of available floating capital to foreign centers. Undoubtedly one factor contributing to this movement is the comparative absence of active speculation.

On the opposite side is the admitted fact that current business continues to be of large volume, notwithstanding the absence of speculation, and some degree of hesitation as to engaging in new enterprises. Nothing has happened this week, at any rate, to interrupt a gradual but steady improvement.

Metallics

Lubricants interfere with amalgamation. Where jaw crushers are mounted over the bins, a tight tray should be used below the toggles to catch dripping oil. The tray must be kept clean or it will fill and overflow.

In cyaniding concentrates at the Oriental Consolidated, Chosen (Korea), the average consumption of cyanide was 3 lb. and of zinc 0.09 lb. per ton of ore treated. The costs of these supplies were respectively \$0.55 and \$0.07 per ton of ore.

Non-spinning hoisting rope, so named because it has no tendency to turn one way or the other, can be used for all purposes for which standard hoisting ropes are used, but it cannot be spliced. The rope is made of 18 strands of seven wires each, 12 of which are laid in a reverse direction around six. As 126 wires are used instead of the usual 114, the rope is about 10 per cent. stronger than standard ropes made of the same quality of wire.

When brass-wire screens of finer mesh than 20 openings per linear inch are used on Huntington mills in which fairly coarse ore is being ground, the breakage and tearing of the screens can be materially reduced by using a coarse screen to support the cloth. Screens of galvanized wire, of four meshes per linear inch, cut to the correct size, can be placed between the finer-mesh screen and the iron screen-frame. The coarse screens will not cause a reduction in the capacity of the mill.

The use of wooden tanks in the tropics, even with timber on the ground, is to be avoided wherever possible; the cost of making is great, using the cheap and inefficient native labor, and the job is never satisfactory; wood-boring insects and rot soon attack the bottoms and chimes. In Nicaragua wood-boring ants have been known to ruin a tank that was full of strong, cyanide solution. Light, galvanized, sheet-steel tanks are to be preferred; they can be assembled at the mine and the inside be protected from cyanide solution by painting.

To fix pencil lines on drawings, rub the drawing with a piece of wax like that used in the manufacture of phonographic rolls. This produces a kind of varnish which protects the lines against rubbing and insures their preservation. Paper as well as tracing cloth can be protected in this manner. Another method is to heat the paper slightly before using it, then spread a solution of warm alcohol and bleached colophony rapidly over the surface so as to thoroughly wet it, after which it is to be dried in warm air. The pencil works easily on the surface of paper so prepared. In order to fix the lines, it is merely necessary to reheat the paper slightly for a few moments. The lines are then covered with a thin coating of transparent varnish, which preserves them in perfect clearness.

By the Way

The alchemist is "hoist by his own petard," the transmutation of \$25,000 worth of gold bars into lead having been accomplished by members of the profession, who can give Doctor Cook pointers on modesty. They are not seeking publicity, but the National Swiss Bank is voluntarily acting as their press agent. On Oct. 24, it informed London bankers that the gold bars shipped from London were found to be lead on their arrival at Berne.

A San Francisco writer on mining and minerals abhors technical phrases and takes pride in simple expressions that plain people may comprehend; in a recent discussion on gold dredging and oil drilling he says: "These giants grasp the earth, separate the yellow flakes, and pile the rocks and boulders into small mountains. These benevolent monsters operate far from the center of the oil industry. While the dredges are working night and day the oil wells are flowing as constantly. Some of the wells, indeed, work without aid." So simple!

A new aspirant for journalistic honors in the mining field, the *Southwestern Mining Recorder*, of El Paso, has extracted this one from what it calls "Col." Jim Finch's inexhaustible supply of stories: Three tenderfeet from Minnesota were being held up by a prospector who was expatiating upon the value of his property. The prospector was giving such free rein to his imagination that one of the tenderfeet, desiring to light a cigarette, said to his two companies, "Look out for that fellow when I strike this match or he'll turn in a fire alarm."

Goldfield Consolidated, which in 1910 was transferred from the curb market to the Stock Exchange, has been steadily and patiently sold ever since, says the *New York Evening Post*, so that from \$9¼ in 1910, the highest Stock Exchange price, it has declined to \$4. Its par value is \$10, and it has been paying \$2 per share, or 20 per cent. per year, in dividends. In five years it has returned to the shareholders \$5.10 per share. The obvious explanation of the liquidation is that the directors in their last report intimated that dividends at such rate might not be continued for an indefinite time. The stock has a curious history. It was a big thing on the curb market and turned out to be an obscure thing on the Stock Exchange. Prior to its being listed on the Stock Exchange several eminent capitalists became heavily interested in it for "investment," and then, having insisted upon its being transferred to the Stock Exchange, they immediately wished to get up a big speculation in it. The only man who might have assisted them refused to do so, because he thought it high enough.

While in the Black hills last week, President Taft visited some of the principal points of mining interest and went underground in the famous Homestake mine. While at Lead, on Oct. 21, the President was given as a souvenir a gold bar weighing one troy pound, contributed by the Golden Reward, Mogul, Lundburg, Dorr & Wilson, Trojan and Wasp No. 2 companies. "It gives me great pleasure to gold-brick the President" stated Representative E. W. Martin in making the presentation. "It is a great pleasure to be gold-bricked in this way," replied the President. Probably this is not the kind of gold bricks they hand him at Washington. Later in the day he descended through the Ellison shaft of the Homestake to the 1100-ft. level, where he was presented with a miners' candlestick made of Homestake gold; after inspecting the workings there, he was taken out through the Star shaft. Two years ago Mr. Taft was taken down to the 1200-ft. level in the Leonard mine at Butte, but we believe that this is the first time a president of the United States has been underground in a gold mine.

The Hawthorne Silver and Iron Mines, Ltd., and associated mining enterprises of Julian Hawthorne, to which attention was called last year, are under investigation by the Federal Grand Jury in New York. The Grand Jury proceedings have followed an investigation by the Postoffice authorities and it is rumored that the present action is the result of an appeal made to Senator Elihu Root by some of his friends who had bought stock in Mr. Hawthorne's enterprises. The office of the Hawthorne Silver and Iron Mines, Ltd., is no longer in the Cambridge building where the Hawthorne typewriters once clicked so merrily and produced an enticing series of brochures beginning with "The Secret of Solomon," and ending in glowing accounts of the opportunities investors would find in silver, gold and iron mines in Canada. After an energetic campaign from this office Mr. Hawthorne removed to London; there, according to the *Sun*, he opened an elaborate office and with the prolific pen which he had diverted from other forms of literature to mining prospectuses, he began to paint for Englishmen the opportunities to get rich through the purchase of Hawthorne Silver Mines stock. Business seemed to flourish for a time until Mr. Labouchere, of *Truth*, informed his compatriots of what some of the American press had had to say about the enterprises. After that the stock sales fell off. Stocks of a par value of something like \$10,000,000 are said to have been successfully distributed in return for real money, but the offices of the company are now reported to be at Kingston, Ontario.

A. I. M. E. Excursion to Japan

The American Institute party, consisting of about 80 members and friends, sailed from San Francisco on the SS. "Manchuria," Oct. 17, and are due at Yokohama on Nov. 3, stopping at Honolulu *en route*. The following itinerary is provisionally announced:

Oct. 17, leave San Francisco, SS. "Manchuria."

Oct. 22, arrive Honolulu, H. I.

Oct. 23, leave Honolulu, H. I.

Nov. 3, Yokohama, Tokyo.

Nov. 4, Tokyo.

Nov. 5, Tokyo.

Nov. 6, Nikko.

Nov. 7, Nikko.

Nov. 8, Tokyo.

Nov. 9, Kamakura, Yenoshima islet.

Nov. 10, Miyanoshita, Hakone.

Nov. 11, Koju, Kyoto.

Nov. 12, Kyoto.

Nov. 13, Nara, Kyoto.

Nov. 14, Osaka, Suma, Kobe, Embark SS. "Omegaka Maru."

Nov. 15, Shisaka island.

Nov. 16, Miyajima.

Nov. 17, Moji, Wakamatsu.

Nov. 18, Omuta.

Nov. 19, Shimoneski. Special train to Yokohama.

Nov. 20, Yokohama.

Nov. 21, leave Yokohama, SS. "Siberia."

Nov. 30, arrive Honolulu, H. I.

Dec. 1, leave Honolulu, H. I.

Dec. 7, arrive San Francisco.

Members of the party, excepting ladies, may make the following special excursions. The size of the party for each excursion is limited to 20 persons.

(1). To the Kosaka copper mine, about 400 miles north of Tokyo, and the Hitachi copper mine, about 50 miles northeast of Tokyo. Leave Tokyo, Nov. 6; return to Tokyo, Nov. 10, and rejoin the main party at Kyoto, Nov. 11.

(2). To Ashio copper mine. Leave Tokyo, Nov. 6, and return to Tokyo, Nov. 8, Nov. 9 or Nov. 11.

(3). To the Ikuno silver mine. Leave Kyoto, Nov. 13; stop at Kobe over night, and on Nov. 14 visit Ikuno, returning to Kobe and join the main party on board the SS. "Omegaka Maru."

(4). To dockyards of Kawasaki and Mitsubishi. Leave Kyoto, Nov. 13, and visit the dockyards after luncheon at Kobe; stop over night at Kobe. On Nov. 14, join the main party in Osaka, or the special party to Ikuno silver mine.

Among the engineers participating in the excursion are: H. Foster Bain, San Francisco, Cal.; David W. Brunton, Denver, Colo.; Will L. Clark, Jerome, Ariz.; Dr. Henry S. Drinker, South Bethlehem, Penn.; Charles W. Goodale, Butte, Mont.; Abbot A. Hanks, San Francisco, Cal.; Robert W. Hunt, Chicago, Ill.; Clement Le Boutillier, High Bridge, N. J.;

William R. McIlvain, Reading, Penn.; E. A. Montgomery, Los Angeles, Cal.; Willard S. Morse, New York, N. Y.; Seeley W. Mudd, Los Angeles, Cal.; T. H. Proske, Denver, Colo.; Dr. Rossiter W. Raymond, New York, N. Y.; Prof. Joseph W. Richards, South Bethlehem, Penn.; William L. Saunders, New York, N. Y.; Dr. Joseph Struthers, New York, N. Y.; Edwin Thomas, Catsauqua, Penn.; Eli Whitney, New Haven, Conn.; Newton R. Wilson, Beaumont, Texas; Philip Wiseman, Los Angeles, Cal.; Reije Kanda, Tokyo.

W. Kuhn, Pittsburg, and Glen W. Traer, Chicago.

Friday, Oct. 27.—Morning session: The Alaskan Question, M. D. Leehey, Seattle; Falcon Joslin, Fairbanks, Alaska; Henry R. Harriman, Seattle; George E. Baldwin, Valdez, Alaska; Hon. William Sulzer, chairman committee on foreign affairs, U. S. House of Representatives.

"The Future of Alaska Coal," by Dr. A. H. Brooks, Washington, D. C.

"Canadian Government and the Mining Industry," by Thomas W. Gibson, deputy minister of mines, Toronto, Canada.

Afternoon session: Public-land question in the West, Gov. William Spry, of Utah; Gov. Richard E. Sloan, of Arizona; Hon. C. C. McCulloch, Baker City, Oregon.

"The Malm Process," by A. G. Brownlee, Idaho Springs, Colo.

"Mine Taxation," by A. W. Warwick, Denver, Colo.

Evening session: Report of committee on general revision of mineral land laws, E. B. Kirby, St. Louis.

Address by John Hays Hammond, New York.

Address by Hon. Walter L. Fisher, Washington, D. C.

Saturday, Oct. 28.—Morning session: "The Federal Government and the Mining Industry," by President William H. Taft.

Time is allowed for a general discussion of each subject by the members and delegates.

American Mining Congress

The American Mining Congress is in session this week in Chicago. This is the fourteenth annual meeting of this body, the provisional program for which follows:

Tuesday, Oct. 24.—Afternoon session: Addresses of welcome by Governor Dineen, of Illinois, and Mayor Harrison, of Chicago. Evening session: Reception and smoker.

Wednesday, Oct. 25.—Morning session: President's Annual address, John Dern. Report of workmen's compensation committee, John H. Jones, Pittsburg, Penn.

"Workmen's Compensation," by C. O. Bartlett, Cleveland, Ohio.

"The Copper Industry," by Horace J. Stevens, Houghton, Mich.

"The Cement Industry of the South," by T. Poole Maynard, Atlanta, Georgia.

Afternoon session: Report of committee on Federal legislation, by John Hays Hammond, chairman.

"The Relation of Congress to the Mining Industry," by Dr. Martin D. Foster, chairman mines and mining committee, U. S. House of Representatives.

"Electric Hoisting," by W. A. Thomas, Pittsburg, Penn.

"Hydroelectric power," by David B. Rushmore, Schenectady, N. Y.

Evening session: Annual meeting of members.

"Problems of the Mining Industry" (illustrated), by Dr. J. A. Holmes, Washington, D. C.

"What is Being Done to Protect the Lives of Coal Miners" (illustrated), by Dr. James Douglas, New York.

"The Mining Industry of California" (illustrated), by E. H. Benjamin, San Francisco, Cal.

Thursday, Oct. 26.—Morning session: "The Coal Industry," by B. F. Bush, St. Louis, Mo. General discussion, by Charles S. Keith, Kansas City, W. S. Bogle, Chicago, and others.

Afternoon session: Economics of the coal industry, Carl Scholz, F. A. Delano and Harry N. Taylor.

"Conservation in the Coal Industry," by Prof. A. H. Purdue, Fayetteville, Ark.

Evening session: The Sherman law and its relation to the coal industry, D.

Zinc Mining in New York

SPECIAL CORRESPONDENCE

Developments in the Edwards zinc district, which have been under way since last spring, continue favorable. About 7000 tons of ore have been taken out during the exploratory work and several times that amount has been blocked out ready for mining. A mill for the treatment of the mixed ore is now under construction and will have a capacity of 50 tons of crude ore per day. About one-third of the product hoisted from the mine is of shipping grade. The Edwards property is owned by the Northern Ore Company, which also has a prospect known as the Balmat, eight miles southwest of Edwards, on which little work has as yet been done. There are several other places in the vicinity where zinc occurs in greater or less abundance. A. J. Moore is in charge of the operations at Edwards, and is now employing 60 men.

North Carolina regained first place among the Eastern States in 1910 in the production of gold. The year's mine production, according to H. D. McCaskey, of the U. S. Geological Survey, was 3291 oz., an increase over the output for 1909 of 1345 oz. There were 23 placer mines in operation in 1910 and 13 deep mines.

Correspondence and Discussion

Aerial Tramway Bucket Brake

In an aerial tramway, about to be built in one of the Western States, there will be several steep grades which will make it advisable to use some device that will act as a brake to stop the bucket in the event of breakage of the hauling cable.

I have been unable to find any description of such a device nor do I know of any manufacturers who make them. Possibly some of the readers of the JOURNAL may be able to offer suggestions or describe in detail such devices as they have seen or used.

E. B. K.

Denver, Colo., Oct. 4, 1911.

[We know of no device on the market for use as a brake to stop the buckets of an aerial tram in event of the hauling rope breaking, nor do we recall having heard of such an accident. The possibility of such an accident and of its doing much damage seems remote.—EDITOR.]

The Value of Lateral Development

A number of years ago the Camp Bird mine, in the San Juan region, was examined by a mine geologist, who advised developing laterally, or along the strike of the vein. Development work had been done to considerable depth and evidently there were greater prospects of finding new ore shoots by lateral than by deeper development.

Since that report was made I have heard of a number of mines where development work had been carried to great depths, while such work, parallel to the strike, had been neglected. The ore was found to be of lower and lower grade as greater depths were attained until, in some cases, there was no more profitable ore visible in the mine. Lateral development in the upper workings, as in the case of the Camp Bird mine, resulted in the discovery of pay ore, giving the mines a longer lease of life.

It seems to me that the importance of developing at depths is, in many cases, overestimated, and in my own work I have been asked scores of questions as to the persistency of profitable ore at depth to one as to persistency in the direction of the strike. It is not surprising that this should be so for in many places the ownership of the vein is limited in the direction of the strike. In regular veins, wherein the ore does not occur in shoots, there is little doubt as to the lateral persistency within the boundaries of claims of the usual size, so that every foot gained by even such localized development as shaft sinking alone, indicates a great possible tonnage of ore.

Views, Suggestions and Experiences of Readers



In regular veins lateral development is not so necessary, for much can be assumed within reasonable limits of safety, and developments at depth are of greater importance, but where the ore occurs in shoots, pipes or chimneys in the vein, it is strange that there should be so many mines where little is known of the deposits in the vicinity of the end boundaries or in places remote from the central workings.

Of course, the shoots of pay ore in the vein may be larger in horizontal than in vertical dimensions, and these shoots of flat pitch may occur in series one below the other, so that it would be more advisable to search for new shoots at depth than laterally, but it is much more often the case, at least in my experience, that the shoots are vertical or pitch steeply; that is to say, their longest dimension approaches the vertical more closely than the horizontal.

A case in point recently came under my observation. A company with limited capital was operating a mine in which the ore was very low grade, and occurred in a series of nearly vertical shoots in a fairly well defined and persistent vein. The outcrop was in a hill and all the ore mined was taken out through an adit entering the hill at its base. All the ore above the adit had been mined in all the known shoots. These shoots continued below the adit—how far was not known. It would have cost a considerable sum to install pumps and hoists to follow the shoots below the adit, a sum of money that the owners were not in position to spend. Even then it was doubtful if there would be a margin of profit, had this ore to bear the expense of pumping and hoisting.

Lateral-development work had been done, consisting in advancing the adit, which, because it was driven wide enough for two tracks, progressed slowly. The work had been advanced beyond the inner boundary of the innermost shoot, a distance twice as great as that between any known shoots, and no new shoots had been found. Production had already ceased and there was but little money in the treasury.

This vein outcropped at fairly close intervals, so two gangs of men were put to

work, one gang advanced the adit, working in three shifts, and the section was reduced to 6 by 7 ft.; the other gang, working day shift only, was set to work trenching along the outcrop. Samples were taken as rapidly as the outcrops could be found and uncovered. Within six weeks of starting, a new shoot had been found in the outcrop, which the adit has since cut. Ore is now being produced, and since the discovery of the first of the new shoots, development work has been carried on as rapidly as possible; several new shoots have been found and they are all much nearer together than any of those previously known.

The indications are that future development work will prove that several shoots occur quite close together in groups, separated by several hundred feet of barren vein matter. It is needless to say hereafter development work along the strike will be actively continued. The owners were on the verge of stopping all work, but have learned their lesson in the value of properly directed development work.

T. R. G.

New York, Oct. 19, 1911.

The Cost of Mining in Nicaragua

In the JOURNAL of Sept. 2, Henry B. Kaeding gives the costs for two months' operations at the Siempre Viva mine in the Pis-Pis district of eastern Nicaragua. The engineers who have visited that country have been surprised to find that

TABLE I. COST OF MINING 102,528 TONS OF ORE

	Amount	Per Ton
Mining.....	\$ 26,927	\$0.262
Milling.....	63,267	0.617
Construction.....	5,210	0.051
Bullion taxes.....	6,956	0.067
Overhead charges.....	15,726	0.153
Total cost.....	\$118,086	\$1.150

TABLE II. COST OF TREATING 27,297 TONS OF ORE

	Amount	Per Ton
Mining.....	\$ 9,035	\$0.331
Milling.....	9,525	0.349
Cyaniding 7,243 tons sand @ \$1.10.....	7,978	0.292
Overhead charges.....	9,798	0.359
Total cost.....	\$36,339	\$1.331

remarkably low costs are attained at most all the mines, and as I have some notes relative to those costs, their publication may be of interest as corroborating Mr. Kaeding's statement that inaccessibility and many adverse conditions do not seriously interfere with mining low-grade ores.

The reason that such low costs are attained is that, except for the Siempre Viva and Lone Star mines, practically all the ore is now being mined by the milling

system. There are a number of small properties where the greater part, if not all, of the ore is mined underground, but by far the greater tonnage is "milled," and at the two mines, for which I give the costs, no other system of mining is used. It is significant that the total tonnage of ore mined per month at these two mines together exceeds the tonnage, several times over, of all the other mines in that part of Nicaragua.

ORE MINED THROUGH ADITS

In these two mines the ore occurs in hills; adits penetrate these near the base and extend several hundred feet into them. At intervals of 50 ft. or so, raises are put up to the surface. Mining consists in breaking out the ground about the collars of these raises until the pits so formed about a group of raises merge into one large open cut. The driving of the drifts is cheaply done as the rock is soft, yet firm enough to stand without timbering, except for a distance of 50 ft. from the portals, where the ground is usually soft or fissured, so as to make timbering necessary. At some places farther from the portal a few sets of timber may be required, and there are several adits that are timbered throughout their length. The usual three-piece sets are used with split-log lagging. The usual section of these drifts is 6x4½ feet.

The ore is a soft gossan that breaks readily, requiring but a small amount of powder now and then to loosen the harder ground. Most of the ore is barred or picked down, one man mining from 30 to 50 tons of ore per day. The ore is trammed to the mill, a distance of 400 to 750 ft. Labor is paid from 80c. to \$1.60 per day, the average of all labor probably being about \$1 per day. In addition to the wage each man is boarded at the expense of the company, which costs from 45c. to 55c. per man per day.

The costs given in Table I are for two full years' operations at the Santa Rita mine, and include all costs of operations. For 17 months two 5-ft. Huntington mills were in use; for seven months five mills were running. The milling operation at this mine consisted of grinding the ore through a 30-mesh screen and flowing the pulp over amalgamated copper plates. Steam power was used; with firewood costing \$3.50 per cord laid down at the boiler, the total cost for power was \$220 per horsepower per year.

The cost of mining includes the cost of tramping, about 5.5c. per ton of ore; the cost of driving the adits, and all the items that make up the cost of breaking ground. During the two years under consideration 950 ft. of drifting and 650 ft. of raising was done. The drifts were about 4½x6 ft. and cost from \$4 to \$6 per ft. to drive, including timbering and laying track. The raises, about 2 or 3 ft. square (they were afterward enlarged by the broken ore coming down through them) required

little or no timbering and cost from \$1.25 to \$2 per ft. In mining about nine tons of ore were broken per pound of powder used, about 80 per cent. of all the powder being used in driving the adits so that the powder actually used in mining was one pound per 45 tons of ore broken.

The cost of milling included all costs on ore after being delivered at the mill. The power cost per ton of ore was about 26c. Construction includes repairs and maintenance of buildings. Bullion taxes include the government export tax on 6300 oz. of gold and all costs of delivering the bullion at the mint in New Orleans. Overhead charges include taxes, insurance, hospital, superintendence and office expenses. The total ore mined in the two years was 102,528 tons.

COST OF CYANIDING SAND

The figures given in Table II are for six months' operations at a mine not far from the Siempre Viva. These costs cover a time when only a portion of the sand from the mill was treated by cyanide. In justice to that property it should be said that the cost of sand treatment has been cut to less than half the cost of \$1.10 per ton of sand actually treated, and that a slime plant has been since installed so that nearly all the pulp from the mills is now treated by the cyanide process. The owner claims to be able to profitably cyanide slime assaying 90c. gold per ton.

These figures are obtained from memoranda that are quite old; the costs have since been reduced. They are of interest in showing the low cost of operations at the property in question. These costs represent all expense.

The system of mining in use and the physical features of the ore, insofar as mining is concerned, are the same as have been described for the Santa Rita property. The higher cost at the former may be due to a harder formation requiring more powder, and to a higher cost for tramping, yet upon the whole the costs are quite similar.

The mill is equipped with 3½-ft. Huntington mills which, at the time these costs were calculated, were driven by water power. During the rainy season there was sufficient power for all the mills, but in the dry season it was often necessary to shut down a portion of the plant, which, of course, reduced its capacity and increased the expense. It will be noticed that the difference in cost of milling at these two properties is almost equal to the cost of power at the mill operated by steam.

Water power can be cheaply utilized in Nicaragua at all the properties where it is available, and once installed the plant costs little to operate, whereas a mill using steam power derived from burning wood is at a great disadvantage for the cost of power rapidly increases month by month until all the nearby sup-

ply is exhausted, when the cost of power becomes so high as to prohibit the mining of low-grade ore.

While the costs of working at all the Nicaraguan mines are surprising low, it is a fact that at most of them the costs can be still further reduced by operating on a more extensive scale. The capital invested by the owners is not great in most instances or else it was not wisely spent. Great economies can be effected could the money be supplied.

The future of no small number of the mines depends entirely upon the solution of the power problem. Each year the expense at plants driven by steam increases as the nearby fuel is exhausted and it is possible in many cases to closely predict the limit of future profitable working. The salvation of most of these mines will depend upon the development of the water power at the Siempre Viva mine, for there is abundant power at the Pis-pis falls, but the cost of transmission lines will require considerable capital.

THOMAS MCKITTRICK.

New York, Oct. 4, 1911.

Gold from Sea Water

Referring to the remarks made in the JOURNAL of Oct. 7, on my process of recovering gold from sea water, I note with interest the objection to the lack of commingling of the ocean waters in connection with this process.

Replying to this objection, I beg to state that in looking for real estate I have considered exclusively such places where a narrow strip of land is bordered on one side by the ocean and on the other by a bay, and which at the same time, is several miles from an inlet; such as the land east of Fire island at the southern end of Great South bay, the land between the Atlantic and Barnegat bay, at Chadwick, Ortley, etc.

It can be readily understood that at such a site, when pumping the water from the ocean into the bay, there is no danger of getting the same water through the pump.

OSKAR NAGEL.

New York, Oct. 13, 1911.

Slimé Thickening at El Tigre

In his description of the El Tigre mill, in the JOURNAL of Oct. 7, Mr. Forbes has conveyed the impression, no doubt unintentionally, that the thickener he describes is not covered by patent. From the information now at hand it appears to our attorney that the principle of the thickener shown is similar to that shown and described in patents owned by this company and to avoid possible misunderstanding, we feel justified in calling attention to this fact.

DORR CYANIDE MACHINERY COMPANY.

Denver, Colo., Oct. 16, 1911.

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 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

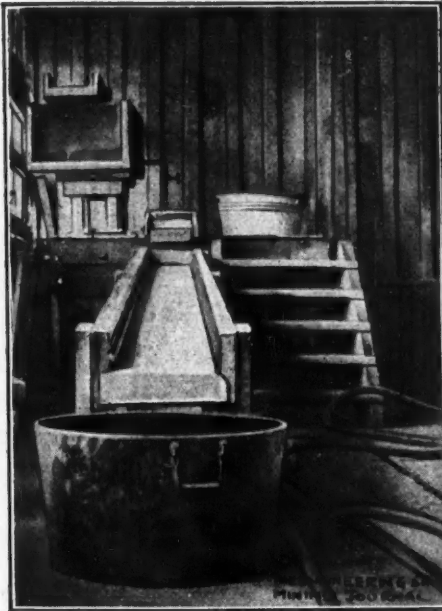
to throw it off again, and it crashed through the timber into the compartment reserved for the men. By the merest chance, no one was there at the time. If there had been a workman in the way, he would most assuredly have been killed as the fall was a long one.

It is just this sort of thing which a manager of a mine should foresee and prevent as far as possible by making his constructions amply strong, even at a slightly increased expense. The cost of a little extra timber would be much cheaper than the obligations imposed upon the company to compensate the relatives of a dead man.

Experimental Canvas Table

BY GEORGE W. MORGAN

In making experiments in fine concentration on canvas tables it is not necessary that a wide table be used. Where there is no means of obtaining a continuous flow of pulp, it is necessary to use small charges and to feed by



CANVAS TABLE FOR TESTS

hand. In the instance illustrated in the accompanying halftone, the table is 16 ft. long and 12 in. wide. It is 32½ in. high at the center, the lower leg being 20. and the upper leg 37 in. long. It is made of 2-in. plank. These dimensions permit a change in slope from ½ to 1/12 in. throughout, the sides being 2x8 in. These dimensions are arbitrary and may be changed to suit local conditions.

There is a distribution box at the head of the table, 12x24x37 in. deep. Above this is a clear-water tank 24x24x15 in. The surface is covered with canvas, the grain of the cloth running across the table, which arrangement is bet-

ter for the retention of the fine-ore particles.

The ore is ground in a small tube mill and carried to the table in a tub, which is placed on the platform at the head and stirred until thoroughly mixed. Then clear water is turned on in sufficient quantity, the pulp dipped from the tub and poured into the distributing box. When all of the pulp has been charged, the clear water is allowed to run until the concentrates are sufficiently clean.

The tailings are caught in a tub if it is desired to cyanide them after concentration. This tub is removed and the concentrates washed with a hose into a clean tub. With this crude apparatus, some satisfactory concentration tests have been made and experiments are being conducted therewith on one of the great tailings problems of the West.

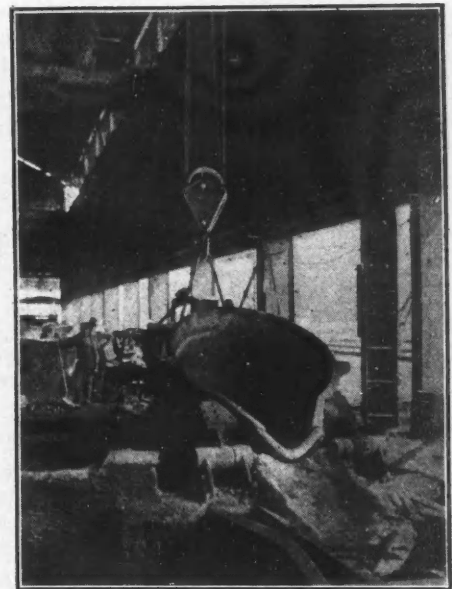
Necessity of Strong Partitions in Shafts

It is usual and proper, in a mine shaft, to separate the compartment reserved for the men from those through which the ore is hoisted to the surface. In some mines it appears to be considered that any sort of timbering is good enough to form the partition, and it would seem as if the temptation to use thin planking which can be nailed in place almost as quickly as it can be sawed, is almost too strong to be resisted.

In one such case an accident of a serious nature was only avoided by a mere chance. A skip was being hauled to the surface, containing a number of large pieces of ore. It had been nearly filled, and by some means the top piece became dislodged and fell over the skip into the shaft. In falling it glanced against the timbering of the partition, then went down the shaft, bounding from side to side. As, however, it passed down, its momentum increased, until near the bottom of the shaft, the thin wooden partition was not strong enough

Matte Pouring Crane

In the accompanying illustration is shown the matte-pouring crane and ladle used by the Mammoth smeltery of the United States Smelting, Refining and



MATTE-POURING CRANE

Mining Company, at Kennett, Cal. As can be seen from the illustration, the matte ladle is set down in a cradle and locked there and then afterward tilted by the jib crane, the main column of which is seen to the right of the illustration, next to the column of the building.

The advantage in using the auxiliary jib crane is that the main traveling crane is not delayed at the ladle while pouring is going on; it can be used in other parts of the building at other work, thus saving time, or at such times when an unusual quantity of matte is to be tapped from the settlers, a second ladle can be brought to the cradle while the first is being poured.

Wear of Screens in Single Stamp Mills

BY ALGERNON DEL MAR*

Those who have had charge of single-stamp mills know how excessive is the wear on the screens. The cost of new screens often becomes a serious factor. The time lost in changing screens, about five minutes for each, must also be taken into account. In the square-mortar type the back screen is, I believe, unnecessary, for it does little work and the screening capacity of the three other screens is greatly in excess of the crushing capacity. It is hardly necessary in the round type of mortar to extend the screen completely around the mortar for the same reason, and because of the fact that the greater the screen surface the greater the cost for repairs in screens for other reasons than the wear, due to the impact of ore particles, as will be explained.

A screen that may last 20 or more days on a five-stamp mortar with a given discharge, may only last two or three days on a single-stamp mortar with the same discharge. The causes of this are many; it is due to the proximity of the die to the screen, in other words to the width of the mortar at the discharge level; to the angle at which the ore is propelled from under the shoe to the angle of the screen frame; to the height of discharge, which determines the aforementioned angle, and, that which my experience points as the principal cause, the bending of the screen outward and inward, due to the suction caused by the rising and falling of the stamp. This action cracks the screen even when there is little other wear. For example, I have known wire screens to break within two days, showing little or no wear; for this reason I have found that the cheaper, blued-steel, needle-punched screen is the most economical, as the bending does not appear to crack this class of screen any sooner than the wire or punched iron, and as they wear out in three or four days, there is no reason to use a more expensive screen for the same tonnage. My experience points to a better output with these thin screens made of blued steel.

M. P. Boss proposed a narrow circular mortar, having the die set below the screen opening as a remedy. As this will cause the discharge to be proportionately high, the purpose of this single stamp, that of giving a high tonnage, is neglected. Mr. Boss' mortar is designed to take the wear of the flying particles on the inside of the mortar, perhaps by a false lining, but he is reducing the capacity of a proportionately high discharge, and if this discharge is brought high enough, the crushing capacity of 5 one-stamp batteries will no more than

*Mining engineer, Fort Bidwell, Cal.

equal a five-stamp battery, in which case the advantages all lies with the latter type of mortar.

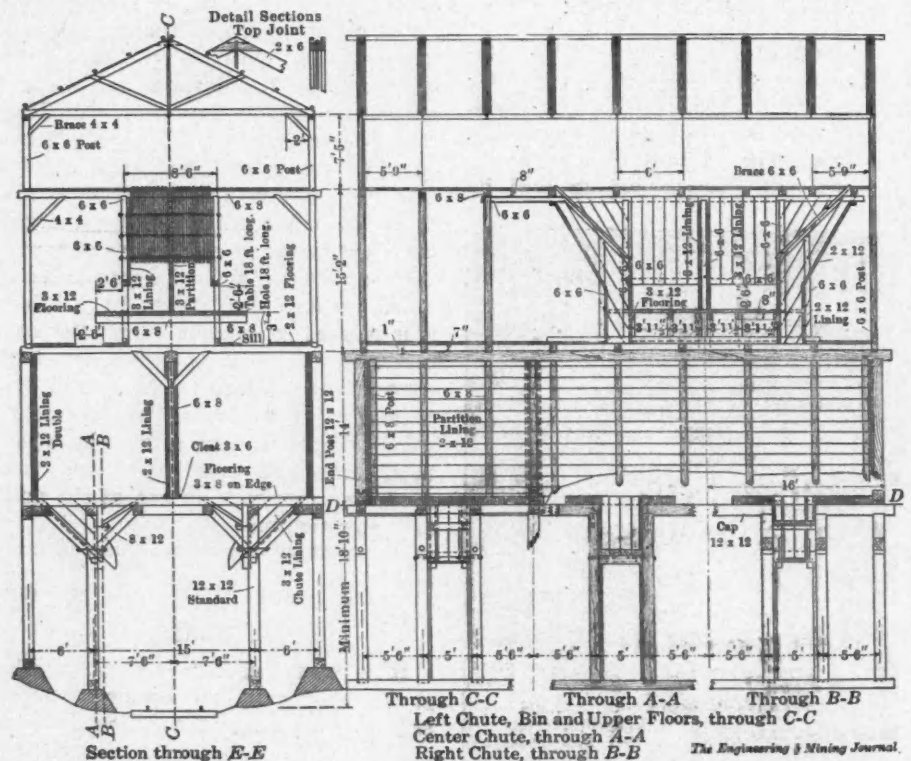
The choice between the single and the five-stamp unit, where the amalgamation of the gold is unimportant, lies with the single-stamp mill, for it is the amount of ore crushed which alone is considered. This being the case, a narrow mortar with a low discharge is required, the economical depth being a subject for experiment. The increased capacity from a low discharge may more than offset the extra cost of screens and the time lost in changing them. If the amalgamation of the gold is the important consideration, then the advantage is all in favor of the five-stamp unit.

There is no reason why the die should be below the mortar opening, for the same effect can be produced by a chuck

Tonopah-Belmont Orehouse

BY CLAUDE T. RICE

The Tonopah-Belmont orehouse, shown in the accompanying illustration, is notable for the novelty, at least in metal mining, of the manner of constructing the ore bins, which is quite similar to some of the bins that have been built at eastern cement works, in that the floor of the bin is carried on a series of separate inner posts, while the outside posts, against which the bottom beams abut, extend to the top of the bin and serve as binding posts, as it were, to give stability. The accompanying elevations and sections show the details of this type of construction. The sorting shed construction is quite similar to the arrangement already described¹ in an article on the orehouses of the Tono-



SECTIONS OF TONOPAH-BELMONT OREHOUSE

block covered with sheet iron on the inside, to take the wear. This argument has the advantage for lowering the discharge at will by simply changing the chuck, while with a deep mortar it may be necessary to take the die out and insert a false bottom under the die to bring it to the desired height.

I am inclined to believe that the screen, if inclined more away from the mortar, would help to make the angle of contact of ore particles with the screen of less importance and consequently lessen the wear on the screens, and if the upper portion of the mortar above the screen discharge was enlarged, a freer expansion and contraction of air, due to the suction of the stamps would result, which would prevent the pulsating movements in the screen.

pah Mining Company, except that instead of the ordinary bar construction of the grizzlies, they are made of cast-steel plates, 1 in. thick with bored holes 2 in. in diameter at the top and 2 in. at the bottom face, arranged in staggered holes and with the plates set at an angle of 40 deg., at which they clear themselves well. The ore hoppers above the sorting tables are lined with steel.

In the construction of the orehouse 73,000 bd. ft. of lumber was used. The ore bin has a capacity of about 750 tons, being divided into three compartments, two of 10,000, and the other of about 5,000 cu. ft. capacity. The structure is 51 ft. long by 28 ft. wide by 64 ft. high to the top of the ridge pole. The main

¹ENG. AND MIN. JOURN., May 27, 1911.

sill timbers are bolted to massive concrete mud-sills, while the bin is supported on seven bents of four posts 12 x 12 in. each. The outer posts reach from sill to top of bin, while the inner line of posts support the longitudinal caps on which the bin floor rests. This floor is made of 3x8-in. planks placed on edge, and is continuous across the whole width, with the outer ends resting on girts that are framed into the outer post. To increase the stability of the bin the girts and long posts are heavily reinforced by 8x12-in. cleats and sway-braces.

The sides of the bin are made of a double lining of 2x12-in. planks, with joints broken, while the partitions also are made of 2-in. planks. There are six steel-lined loading chutes, three on each side of the track. These are fitted

The Area of Amalgamation Plates

BY CLARENCE C. SEMPLE

Since the cyanide process for extracting gold from its ores has become so widely applicable, there has arisen a faction that advocates the abandonment of amalgamation and the adoption of the all-cyanide treatment. Amalgamation plays a minor part in the recovery of gold in the ore treated at the Goldfield Consolidated and certain other mills, but the Goldfield company did not abandon the use of the amalgamation plates in front of the batteries because of the inefficiency of amalgamation, as the all-cyanide advocates might suppose, but to prevent loss by theft of amalgam from the plates.

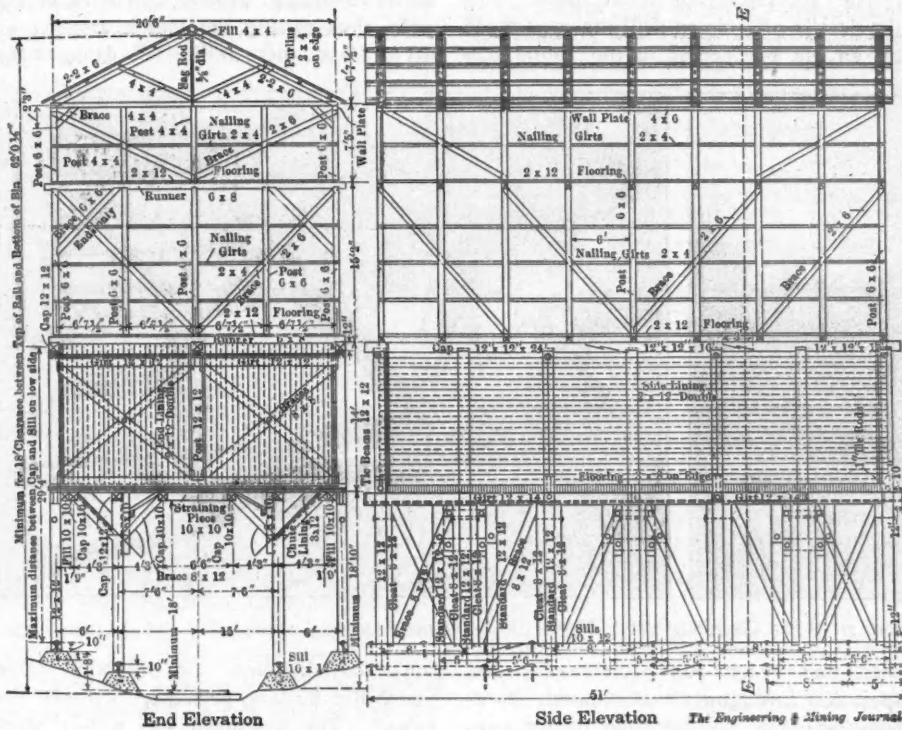
owners may not be able to afford a cyanide plant, will amalgamation plates be found whether the gold in the ore be fine or coarse. Many small cyanide plants will probably be paid for from the gold recovered by amalgamation.

An examination of the pulp that has passed over an amalgamation table will generally reveal the presence of a certain amount of amalgamable gold which has escaped amalgamation either because it has not come in contact with the mercury-coated plates or because it takes an appreciable space of time for such gold to amalgamate and in its passage over the table it has not been in contact with the mercury for a sufficient period of time. The time element also enters inasmuch as it takes an appreciable space of time for the gold particles to settle through the stream of pulp.

Given clean mercury and well kept plates, the improvement in the efficiency of amalgamation would seem to consist in giving the gold particles more opportunities to come in contact with the plates and a greater interval of time in passing over them. It is probably true that the greater the time taken in flowing over the plates the greater the number of chances for a gold particle to come in contact with them. To do this, wide plates and a thin layer of pulp are necessary.

The Homestake mills are noted for the great area of the copper plates. The unusual length increases the time that the pulp is flowing over an amalgamated surface, but perhaps, as one engineer has pointed out, the long plates have a pronounced action in retarding or breaking the passage of the pulp particles over them, somewhat after the manner of a canvas table, except that on the canvas table the retarding action of the cloth gives the heavy particles a chance to settle between the threads. The effect of extremely long plates may be similar in kind but different in degree, and the gold particles become attached to the amalgam on the plate instead of sinking between the threads. The long tables undoubtedly do have considerable effect in overcoming the inertia of the particles hurled rather violently through the screen by the dropping stamps.

Another consideration in amalgamation is the quantity of water required and slope of the tables. The finer the ore particles the greater the quantity of water that will be required to make a thin pulp, but the pulp composed of coarse particles requires a much steeper grade to the plates than pulp composed of fine particles, or else a large additional quantity of water must be used to sluice the coarse particles over the plates. In usual mill practice the grade of the plates is greater than required by the fine pulp but less than required for the



ELEVATIONS OF TONOPAH-BELMONT OREHOUSE

with No. 3 Bolthoff lever gates, with movable steel spouts. A clearance space of 18 ft. is provided above the rails, so that a locomotive can go under the bin. Above the bin the orehouse part is covered with galvanized, corrugated iron.

The design of these orehouses is quite different from those built on the Rand in which region sorting is done at almost all the mines, but the Tonopah houses are well designed to meet the conditions of sorting in that Nevada district. The advantages of sorting are now being widely discussed and as there is a tendency to adopt the practice in fields where it has never been used, what has already been done both in the practice of sorting and the equipment and design of the houses is of constantly increasing interest.

In the treatment of ore where an all-sliming process is used and where all the gold is in a fine state of division there would not seem to be any advantage in amalgamating before cyaniding, but where the gold is coarse the treatment of the ore by cyanide without previous amalgamation might necessitate such a long time to allow for the dissolution of the coarse gold that an inordinately large cyanide plant would be required. In such a case the removal of coarse gold by amalgamation would be an essential feature in the treatment of the ore.

However, aside from the consideration of the advantages offered in the recovery of coarse gold, amalgamation will for a long time to come continue to be an important process for recovering gold. Especially at the small mines, where the

coarse. To prevent the coarse from banking, the quantity of water is increased, which greatly dilutes the fine pulp and increases the velocity of those particles in passing over the table. In other words the excess water decreases the time interval for the passage of fine particles and if additional plates are added, the coarse particles are in contact with the amalgam for an unnecessarily long interval and may even cause loss of gold by sorting.

The rational balancing of the plate area would seem to lie in using two or more sets of tables and classifying the battery discharge so as to make two or more sizes of pulp, then causing each grade of pulp to pass over the tables inclined at the most desirable slope for that size, and with the desired amount of water for each classifier product. The finest pulp would then pass over the table with least inclination, but the pulp would contain the most water. To make

the fine pulp should flow over the longest plate; the coarse particles over the shortest. Of course, these statements will not be true if the plates are too crowded.

It would probably be found that by using such a classification before amalgamation that the total quantity of water could be materially reduced, and with two or three sets of plates set at the least grade necessary to keep the pulp flowing over them either more gold would be recovered or a less area of plates would be required to recover the same quantity of gold as compared with amalgamation without classification.

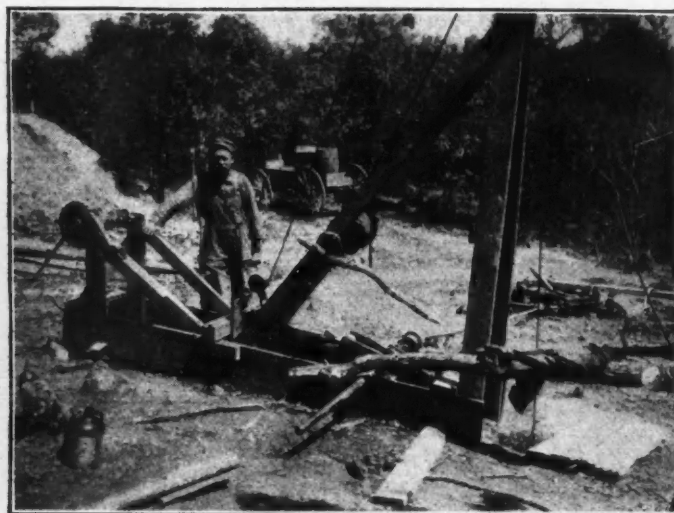
A Homemade Churn Drill

BY OTTO RUHL*

The accompanying illustrations show the details of a churn drill that was made by an old prospector in the Joplin dis-

trict. He also bought two 2x10, two 2x8 and some 2x6-in. pieces of lumber. The 2x10-in. sticks were 10 ft. long and were used as a base for the machine. The 2x8-in. pieces were 18 ft. long and were used for the drill mast with one of the pulleys at the top for the cable to pass over. The 2x6-in. pieces were used as braces and framing material. One winch was used for the pulling of the tools from the ground and the other for pulling the sand bucket.

For power he used an old horse-whim, taking off the winding spool and substituting in its place on the tumbling rod two 2x4-in. pieces of lumber 20 in. long. These pieces had a small roller cam at either end. Bolted securely to the tumbling rod, this cam revolved and engaged a hickory spring pole to which was attached the tool cable. The cam in its revolution pushed down the spring pole, thus raising the tool a distance of 10 or 15 in., then, rolling off, dropped the



BORING IN SOFT GROUND WITH HOMEMADE DRILL

the interval of contact or time of flow equal for the various sizes, the finest pulp would require the shortest and the coarsest pulp the longest tables but there is a consideration other than time to be regarded; that is the opportunity or chance of a particle of gold coming in contact with the amalgam. Such chances, may within reason, be assumed as approximately in inverse proportion to the number of particles in a given volume of the pulp, in other words, the finer the particles, the greater number there will be in a unit volume and the smaller the chances of any one of them reaching the amalgam, because the finer particles will have less power to sink through the layer of pulp and because the force of the stream, which will depend upon the grade of the table, cannot be reduced beyond a certain limit without causing banking. To increase the opportunities for the fine particles coming in contact with the amalgam the time of flowing over the plates must be increased, so regarding all considerations

trict, and which has been in constant operation throughout the summer. It illustrates what can be done through resourcefulness. Constructed at a cost of less than \$25 for materials and the labor of two days, the machine thus built represented only a small investment, yet it has served the purpose for which it was designed.

Joseph Dillon, a prospector of 30 years' experience in the Joplin district, conceived the idea that he had better prospect by a churn drill rather than by sinking many shafts; but the cost of the drill was too big an item for him, even though he was searching only for the shallow ores that occur at a depth of from 40 to 100 ft. During his lifetime he had sunk 70 shafts. Finally he visited a junk yard, where he obtained two or three pulleys and parts of two winches which, while small, seemed to serve the purpose for which he desired them. He also purchased bolts and nuts enough to put the drill

tools that distance. An old blind horse worth five dollars, perhaps, furnished the power. The tool used was a 3-in. steel bar 15 ft. long. A 1/2-in. steel-wire cable was used. The 100 ft. of cable costs \$3.50 new and, at second hand, half that amount.

Tried out practically the results showed that Mr. Dillon could drill to a depth of 100 ft., but that beyond 90 ft. the progress was slow and costly. In hard ground the drilling was slow, but in soft, open ground the progress was fair. From 30 to 60 ft. per week could be drilled with this device, depending upon the hardness of the ground and the need of casing. Counting his time and the horse at \$4 per day, the cost per foot under normal conditions was from 40 to 90c. This compares with 85c., the minimum, for contract drilling in large contracts with a Keystone drill the initial cost of which is about \$1500. Mr. Dillon and his associates attempted to drill only soft-ground deposits.

*Mining engineer, Joplin, Mo.

The Potash Salts Settlement

In a statement published on the authority of a large fertilizer corporation, in the *New York Journal of Commerce*, it is announced that an agreement has been reached between the American holders of contracts covering the delivery of German potash salts up to 1917 and the independent potash mines, whereby the Americans are to pay 2,100,000 marks, or approximately \$525,000, for the cancellation of these contracts. When this agreement is signed the potash war that began June, 1909, will terminate. The Americans, forced to the wall with the aid of the German government, will be compelled to buy their potash at prices equivalent to those that prevailed previous to the breaking up of the syndicate over two years ago. The only advantage that has been secured is one of a slight increase in the discount allowed certain large buyers on long-time contracts. The cost of the litigation involved in the controversy will amount to a large sum, as prominent attorneys were identified with the matter from time to time.

According to the plan of settlement, which now awaits the signatures of the various parties to the negotiations, the Aschersleben potash works will agree to the cancellation of the five years' contracts with the American Agricultural Chemical Company upon payment of 1,050,000 marks. Upon payment of a similar amount by the group of 70 independents the contracts with these concerns will likewise be canceled. The Virginia-Carolina Chemical Company entered into an agreement with the syndicate in the spring, and it is stated that it cost that corporation 100,000 marks for attempting to secure its potash without the sanction of the German monopoly sales office. This company's contract was for only one year. The Armour Fertilizer Works entered into an agreement with the syndicate a few months ago, but this concern is also reported to hold independent contracts and will probably be assessed an amount in proportion to its proposed deliveries. The 2,100,000 marks will be paid to the Aschersleben potash works as a compensation for the cancellation of its contracts. The Sollstedt mine, which furnishes the International Agricultural Corporation with potash for its own use, will be allowed to mine 20,000 tons of pure potash in excess of its allotted amount prior to the end of December, 1911. The agreement, however, distinctly states that no new contracts are to be made for the delivery of this potash, but that it is to be used for the purpose of making delivery against contracts now in force or for the manufacture of fertilizers by the International concern, owners of the mine. It is understood that both the Aschersleben and Sollstedt mines will rejoin the syndicate just as soon as the agreement has gone through.

The situation now becomes practically the same as that existing before the attempt to break up the monopoly was made. The Kali-Syndikat is in full control, with the additional advantage that the Prussian government is now a member and interested in carrying out the purposes of the syndicate.

Federal Mining and Smelting

The annual report of the Federal Mining and Smelting Company, for the year ended Aug. 31, 1911, shows that the net earnings amounted to \$1,241,115, an increase of \$497,307 over 1910. While the net earnings at the Wardner mine decreased \$26,832 for the year, the total net increase is accounted for principally in the increase of the profits of operations at the Morning and Mace mines, together with a large decrease in the amount expended on new construction, etc. The Omaha royalties during the last year amounted to \$58,645. It is expected that

Assets	1911	1910
Mines and equipment (a)	\$18,000,000.00	\$18,000,000.00
Investments (b)	280,000.00	396,280.00
Material and supplies	124,655.22	126,245.74
Accounts receivable	379,446.78	171,441.38
Cash on hand	925,690.87	790,367.37
Total	\$19,709,792.87	\$19,484,334.49
Liabilities		
Capital stock, preferred	\$12,000,000.00	\$12,000,000.00
Capital stock, common	6,000,000.00	6,000,000.00
Accounts payable	224,201.71	259,467.81
Dividends payable Sept. 15	209,756.75	209,756.75
Surplus account	1,275,834.41	1,015,109.93
Total	\$19,709,792.87	\$19,484,334.49

(a) Property account carried at the par value of outstanding capital stock, regardless of its actual value of property.
 (b) 28,000 shares of Bunker Hill & Sullivan carried at par.

the Omaha ground leased to the Caladonia company will be exhausted by about the end of the year and that earnings from this source will thereupon cease. The exploration of the Page group and of the Black Hawk group westerly on the Wardner vein failed to develop commercial ore and further operations on both properties have been abandoned for the present.

THE MACQUISTEN TUBE

At the Morning mine one unit of the Macquisten tube has been established and in operation long enough to demonstrate that it is capable of earning approximately \$1500 per month. The savings have been largely in zinc; the amount of lead saved through this process is not so great as was anticipated. The cost of this first unit was approximately \$35,000, and it would require at least three more units to take care of the entire output of the mine. Many changes have been tried at this mine during the year, in an effort to make a greater profit from these ores, and good results have been obtained. At

present, however, the peculiar character of the ore has baffled all milling experts, and only 50 per cent. of the lead is saved as compared with 80 per cent. at the other mines.

The developments on the lower levels of the Mace mine have shown a diminishing orebody, and for this reason it was deemed wise to secure an expert opinion on the property. Horace V. Winchell was engaged for this work, and in his report states that he is obliged to confess that he has not discovered anything in the geological structure that was not already known to the company officials. His opinion is that at a depth of about 3500 ft. from the outcrop, measured along the dip of the vein, the mine is approaching that period of old age at which the prospect for the future is not so hopeful nor the mine so promising. He further states, however, that explorations will undoubtedly reveal more ore, and that there is quite a quantity of ground in the upper levels of the mine which is as yet unprospected and which should be explored.

There were mined at all of the properties 784,600 tons of ore, of which 32,609 tons were first class. There were milled 726,499 tons, an average of 60,542 tons per month, being a slight increase in tonnage over last year. There were produced 118,315 tons of lead concentrate and shipping ore averaging 44.18 per cent. lead and 27.93 oz. of silver per ton, and 531 tons of zinc concentrate averaging 46.9 per cent. zinc.

DEVELOPMENT AND EQUIPMENT

Development work at the Wardner mine was satisfactory, there being more ore in reserve above the Sweeny tunnel than at the beginning of the year. At the Mace mine, on the 1250-ft. level, the oreshoot west of the shaft is about 1/2 gone and prospecting east of the fault in the hopes of picking up the vein has had no result as yet. The oreshoot on the 1550-ft. level has been opened up for about 1000 ft. and is not yet through the shoot; the ore is of fair grade although not as good as on the 1450-ft. level above. The oreshoot on the 1850-ft. level has been developed for 800 ft. during the year and the ore has increased in grade. In the Federal ground the thickness of the ore in the bottom level has decreased about 20 per cent. from the 1450- to the 1850-ft. level and the quality has decreased somewhat also. At the Morning mine the vein conditions on the bottom level are quite satisfactory and the quality of the ore has improved somewhat. It is stated that the ore lends itself to sorting but the resultant mill feed, after the first-class ore and waste have been sorted out, is as difficult to treat in the mill as the average ore that exists on the levels above. Sinking at the Mace and Morning mines will be continued.

General overhauling of the Wardner and Mace mills is in progress and in-

cludes the improvement of the classification and treatment of slime. The Mammoth mill has been leased to the Stewart Mining Company, subject to revocation. At the Morning mill, in order to properly prepare the material for the new Macquisten plant, considerable experimenting has been found necessary. This plant has to date made a profit of approximately \$1 per ton of material treated. The experiments have proved the necessity of finer grinding and it is hoped to overcome this in part by improving the crushing practice.

ORE RESERVES

The total amount of milling ore in sight at the end of the year was 863,340

INCOME ACCOUNT

	1911	1910
Total value of product.....	\$5,338,653.44	\$4,757,468.94
Deduct:		
Cost of production.....	2,391,446.92	2,173,341.37
Development.....	39,169.98	200,898.15
Smelter freight and treatment.....	1,762,114.98	1,638,175.99
	\$4,192,731.88	\$4,012,415.51
Net profit from production after deducting expenditure for development.....	\$1,145,921.56	\$745,053.43
Add:		
Rentals.....	23,179.03	18,333.70
Interest.....	17,255.85	23,361.71
Miscellaneous.....	1,943.80	8,209.91
Dividends from investments.....	82,600.00	35,050.00
	\$1,270,900.24	\$830,008.75
Deduct general expense.....	29,785.05	86,201.10
Net earnings carried to profit and loss account.....	\$1,241,115.19	\$743,807.65

PROFIT AND LOSS ACCOUNT

Balance previous year.....	\$1,015,109.93	\$1,761,415.64
Net earnings this year.....	1,241,115.19	743,807.65
	\$2,256,225.12	\$2,505,223.29
New construction, uncollected accounts, etc.....	\$141,363.71	\$651,086.36
Dividends.....	839,027.00	839,027.00
	\$980,390.71	\$1,490,113.36
Balance to next year.....	\$1,275,834.41	\$1,015,109.93

tons. At the Wardner the milling ore has decreased about 5 per cent., the metal content decreasing only about 3 per cent., so that the reserves remain practically unchanged. The amount of first-class ore shipped from the Wardner has been brought up to between 500 and 600 tons per month by means of sorting. At the Mace the milling ore in sight has decreased about 10 per cent., while the contents of the concentrates and first-class recoverable therefrom have decreased approximately 16 per cent. The tonnage in sight at the Wardner is expected to last 18 months, and that at the Mace about 13 months.

The Cleveland group of mines has been optioned and development of the ground is now in progress. It is hoped by the

first of January, on which date a payment will have to be made if the property is to be taken over, that development work will have proceeded far enough to determine the desirability of taking over the property. The reserves at the Morning mine have decreased 35 per cent., but the first-class has increased about 16,000 tons.

The suit brought by the farmers against the company to secure damages for debris alleged to have been deposited on their land along the Cœur d'Alene river has been dismissed. One or two suits of a smaller nature are still pending, but in a general way the debris entanglement is believed to be well along toward final disposition.

While the results of the operations for the year were quite satisfactory, the company believes that the outlook for the future makes it desirable to secure other property of a character likely to increase the life of the company and to cure the diminishing resources in this district. During the last year the management has investigated numerous mining properties which were attractive on paper, which on closer investigation turned out not to be desirable as an investment. It is further stated, however, that everything possible is being done along this line.

West Shining Tree District

TORONTO CORRESPONDENCE

R. B. Stewart, demonstrator in mining at the University of Toronto, has made a preliminary report to the Ontario Bureau of Mines, of an investigation of the West Shining Tree district, which has lately attracted attention as a new goldfield. The region inspected includes the townships of Asquith, MacMurchy, Churchill and Fawcett. West Shining Tree lake, where the first discoveries were made, lies in the townships of Asquith and Churchill, and is 70 miles north of Sudbury, 60 miles south of Porcupine, and 20 miles west of Gowganda. The country around the lake is one of low relief. While level and devoid of prominent elevations, it cannot be called swampy, the general level being well above the water of the numerous small lakes occurring in the region. The area, for the most part, is not heavily drift covered, but owing to the level nature of the ground the rocks are not exposed extensively.

The geology is rather complex. The rocks where the claims are located are of Keewatin age, consisting of greenstone, altered diabase and schist. Associated with these are porphyry, rhyolite and a rusty weathering rock, regarded as corresponding to the ferrodolomites of the Porcupine district. Fresh-looking diabase found in several places may prove to be post-Huronian. The schists, as a rule, have a strike several degrees north of east and are nearly vertical,

but tipped slightly to the north. An area of Laurentian granite lies to the south.

DISCOVERIES ON WEATHERED SCHIST

The discoveries are mainly located on zones of weathered schist containing veins and stringers of quartz, that generally conform to the strike and dip of the schist. As to their extent not much can be said, as but little stripping had been done at the time of the examination. The quartz widens in places to several feet, but does not carry this width far till it breaks up into stringers or disappears. On one claim one of these zones had been traced for eight or nine chains. The quartz is usually white and contains considerable rust, but on three properties a bluish quartz was found. In some places the quartz and schist contain iron pyrites and small amounts of galena were observed in two places. While most of the quartz veins and stringers have a strike conforming to the general strike of the schist, a few degrees north of east, on three properties visited the strike of the quartz outcrops was in a northwesterly direction, suggesting that a second system of veins may occur. Thirteen properties were visited and free gold was seen in place at Gosselin's, Jefferson's and Caswell's. Gold was seen panned from decomposed material on Cryderman's claim.

THE GOSSELIN PROPERTY

The stripping done on the property known as the Gosselin, which has attracted the most attention, reveals what is apparently a large body of quartz with free gold in several places. What is evidently the same body has been found at intervals for over 10 chains with a width of three or four chains. The rock associated with the quartz is a rusty schist and also a hard flinty rock in which a schistose structure has been developed in places. The rocks in places are intersected with quartz stringers, forming sometimes half the total. Where the most stripping has been done the quartz shows continuously for two chains. A trench at almost right angles shows quartz for about 70 ft. with some streaks of schist. At the Clark property, about one mile in a southeasterly direction from the Gosselin, the work done shows a large mass of quartz and a greenish rock that weathers rusty. Many pyrite crystals occur in the rock and sometimes in the quartz. No gold was seen but it is claimed that gold can be panned from the decomposed material. Mr. Stewart states that he found it difficult to obtain definite information as to many of the properties, owing to the absence of the owners. Assays made at the provincial assay office of seven samples collected from different properties where no gold was to be seen, showed that one contained no gold, and the others assayed from 40c. to \$6 per ton.

Consolidated Mercur

The report of the Consolidated Mercur Gold Mines Company, Mercur, Utah, for the year ended June 30, 1911, shows that the mine has about reached the limit of its resources. Prospecting, however, is being continued.

The report of General Manager G. H. Dern, for the year ended June 30, 1911, gives the tonnage hoisted and milled as follows: Base ore, 78,897 tons; oxidized ore, 131,622 tons; tailing, 28,671 tons; total, 239,190 tons. The average value of the material treated during the year was \$3.21, and of the tailings, 88c. These figures are not comparable with similar results in previous years, because this year the tonnage included 12 per cent. of old tailings that were re-treated, and this low-grade material, of course, made the general average less than it would have been if the mill were running on mine ore alone.

The operating costs for the year, including prospecting, repairs, general expense and all miscellaneous items, were as follows: Mining, including tailing dumps, \$1.29; milling, \$1.04; total, \$2.33 per ton. The gold production during the year was 26,675 oz. The cost per ounce to produce and market this gold was \$20.92, which shows a loss per ounce of 25c. On the basis of direct operation, therefore, it cost more to produce the gold than the returns. The small net gain for the year was due to receipts from sources other than the sale of gold. However, inasmuch as all the miscellaneous receipts are directly dependent on mill operations and would cease as soon as operations were discontinued, it is a mistake to conclude that the mines were operated at a loss and consumed revenue derived from other sources of income.

MILL REPORT

During the year 78,897 tons of base ore were roasted, the average daily duty being 73.6 tons per furnace. By a change in manipulation the roaster duty was increased in June to 86 tons per furnace per day. The cost for labor, power, fuel, etc., was \$0.92 per ton roasted. The official report shows that the slime plant handled 54,677 tons at a cost, including classifying, settling and filtering, of \$0.115 per ton against the tonnage classified in the slime plant or \$0.088 against the year's total tonnage. The tailing averaged \$1 per ton. Special attention was given to the leaching department during the year and it was operated most efficiently.

A series of tests recently made showed that only 6c. of dissolved gold per ton were left in the tailings. The average value of the sand tailing was 84c. per ton. The number of tons leached during the year was 182,789. The consumption of cyanide in this department was \$0.74 lb. per ton. In the precipitating

department the cost was \$0.05 per ton of ore; the consumption of zinc dust 0.40 lb. per ton.

The Geological Survey in Alaska

SAN FRANCISCO CORRESPONDENCE

Alfred H. Brooks, geologist in charge of the Alaska work of the United States Geological Survey, arrived in San Francisco on Oct. 18, having completed the season's work in Alaska. Director George Otis Smith met Mr. Brooks and again offered him the position of chief geologist of the Survey, which Mr. Brooks declined for the reason that he has so many plans for continuing the work in Alaska and that he wanted to be certain that the work would be carried out as he had planned it before he left. He believed that he could be of greater present and future service to the Survey by retaining his position in charge of the Alaskan work.

Mr. Brooks has been in charge of the Survey work in Alaska for 14 years and has a broader knowledge of the geological and mineral conditions there than any other one person who has covered the Alaskan territory. He accompanied the Secretary of the Interior in his recent visit to Alaska and was with him during the entire stay of the secretary's party in the field. He declined to express any opinion or to describe the situation as the secretary found it, preferring, of course, to leave that to the secretary himself.

ALASKA COAL

Respecting the coal situation, Mr. Brooks stated that had the Alaskan coal-fields been opened up to industrial and commercial enterprises 10 years ago, or before oil fuel had become so thoroughly established, there would have been sufficient demand for Alaskan coal to encourage the exploitation of the Nome fields and the exploration of new ones. The Alaskan coal would then have established a market; but the fuel oil development in California within the past 10 years has completely reversed the conditions, so that coal dug in Alaska will find strong competition and it is a question whether any considerable amount of it can be sold at a price which would insure a profit to the operators. He stated that the future should make a demand for the Alaskan coal for coking, provided the manufacture of iron and steel on the Pacific Coast should be established.

Mr. Brooks stated that three years ago, when he compiled the statistics on coal fuel and oil consumption as regards Alaska, there seemed to be then a possible market for 1,000,000 to 1,500,000 tons of coal; but that since then the oil production has expanded until the market for Alaskan coal has been almost destroyed.

MINERAL AND COMMERCIAL VALUES

Mr. Brooks stated that the term "value" as applied to minerals is often misconstrued and particularly has it been so misused in its application to the Alaskan coal lands. He admitted that the Alaskan coal has a very positive mineral value, which would become an industrial value provided there was a commercial demand; that these coal lands were purchased at \$10 an acre and if the purchaser should wait 100 years for them to attain commercial value, they will have cost him \$2500 an acre at compound interest. The average man, he stated, does not always consider the commercial value in talking of the value of coal lands.

SURVEYS IN ALASKA

In the last season there have been 13 Geological Survey parties in the Alaska field, numbering about 50 men, including camp men, and about 22 technical men, geologists, engineers and topographers. There have been three general classes of work carried on: (1) Making topographical maps of mining districts; (2) studying the geological and mineral resources; (3) investigations of the waters and water power that can be used in mining. There were two parties of geologists and two parties of engineers, and the plan of the work is to cover the whole country with the reconnaissance surveys and then in the important mineral districts to make detailed surveys. In the reconnoissances the field men have covered more than one-fifth of the territory. If those parts of the country which are of no commercial importance were eliminated, the percentage of ground covered would be greater, or possibly one-quarter of the territory. In this way there have been maps made of the entire Seward Peninsula, which is popularly known as the Nome region; also of the Yukon-Tanana, which includes the Fairbanks, Forty-mile and Birch Creek districts, the most important placer districts in Alaska.

United States Gypsum Production

The importance of the gypsum industry in the United States is shown by figures compiled by E. F. Burchard, of the U. S. Geological Survey. For 1910 the value of gypsum products was \$6,574,478 and the amount of gypsum mined 2,375,394 tons. This was an increase over the figures for 1909 of more than 5 per cent. in tonnage. Our gypsum industry is independent of foreign sources, for the value of the imports in 1910 amounted to less than 8 per cent. of the domestic output.

New York was the largest producer of gypsum; Iowa came second, and Michigan third. The bulk of the gypsum

produced was manufactured by grinding and partial or complete calcination into plasters of various kinds. A large quantity of gypsum is used in the raw state as a retarder in Portland cement.

East of Mississippi river the gypsum-producing sections are confined to areas in Michigan, northern Ohio, central and western New York, and southwestern Virginia. West of the Mississippi, deposits of gypsum are both numerous and widely distributed. The material is mined in Alaska and in the Western States of Arizona, California, Colorado, Idaho, Iowa, Kansas, Montana, Nevada, New Mexico, Oklahoma, Oregon, South Dakota, Texas, Utah and Wyoming. Plaster mills are in operation in at least 14 of these States. The Alaska gypsum is shipped to Tacoma, Wash., where it is prepared for the market.

Horace H. Emrich

At about 7:30 o'clock in the evening of Oct. 17, Horace H. Emrich was killed at Kyshtim, Russia. A shot fired through the window of his residence penetrated his heart, resulting in instant death. As he was popular with his associates and the men under him, the management of the Kyshtim Corporation, Ltd., by whom he was employed, is at a loss to understand who could have perpetrated the deed, but it is suspected that the shot was fired by someone having a personal grudge against him. The matter is being actively looked into by the Russian authorities.

Mr. Emrich was born in New York, Oct. 11, 1880. When about nine years old his family moved to Colorado, and his early life was spent in that State. He attended the Golden School of Mines and was graduated from that institution in 1903. During the vacation periods in his college course he spent a great deal of time at the Colorado smeltery, in Pueblo, which was operated by his uncle, Anton Eilers, and the experience gained during his student days at this plant was of great value. After his graduation he spent about six months working at the Colorado smeltery and then came east to accept a position in the Perth Amboy plant of the American Smelting and Refining Company, commencing in the fall of 1903 as shift boss in the electrolytic-copper department, in charge of the silver slimes from the electrolytic tanks. He was gradually promoted to assistant to the superintendent of the copper department, and finally to the position of superintendent of the copper department, which he held from the end of 1908 to the early part of 1910. He then resigned his position with the American Smelting and Refining Company and was appointed superintendent of the electrolytic refining department of the Kyshtim Corporation, Ltd., at Kyshtim, Perm government, Russia, which position he filled with a

great deal of credit to himself until his death.

Mr. Emrich though young, was a man of great executive ability, and always handled his men and those under him in a firm but perfectly just manner. The situation he found at Kyshtim was most difficult, but he met the difficulties in such an able manner that the result was highly satisfactory to the management, who feel greatly their loss in his death. His wife and their two young children were with him at Kyshtim, but will undoubtedly return to the United States soon.

A Mexican Opal Mine*

By T. M. M. MACFARLANE†

At present most of the producing opal mines in Mexico are situated in the state of Queretaro, though in the past Zimapan, Hidalgo, was also noted for fine stones. The mine I visited is situated near the top of a range of hills composed of reddish-gray spherulitic rhyolite, forming the matrix through which the opals are irregularly scattered. Work was commenced about six years ago at a place where some opals had become exposed through weathering and were seen shining in the sun. The opal-impregnated areas are now traced by surface indications called *pintas*. These become visible through the weathering of the rock and consist for the most part of a white silicious sinter filling cavities in the rhyolite. *Pintas* are infallible indications of opals, but the quality and quantity can only be proved by development.

The mine is at present being worked by quarrying methods. The depth of the breast is about 40 ft., of which the lower 25 ft. are productive. The 15 ft. at the top consist of decomposed rhyolite, which carries no opals. The lower productive level is undercut as far as possible, and when the safe limit of work has been reached the upper layer is stripped down by long holes and dumped down the hill. Gunpowder is used for the upper layer, but dynamite is necessary for the lower, as the rock is generally hard and compact. When the mine boundaries have been reached in this way work commences again at the entry and another horizontal slice about 30 ft. in depth is taken off. This has been found the best method of working from an economical point of view, as the opals do not follow any particular run.

The limit in depth of the opal zone is not known, but I am informed that some of the older mines are still productive at over 100 ft. vertical. As the rock is broken it is stacked in a pile and broken up later into 2-in. cubes or less, as quite often a stone will be found in a piece of rock which looks barren. The working

†Zacualpan, Mexico.

*Abstract of a paper read before the Instituto Mexicano de Minas y Metalurgia, Aug. 7, 1911.

faces usually have a corroded appearance, and in the numerous cavities deposits are found of many kinds of silica. Many of the cavities have a lining of clear brittle quartz, in which the opal is loosely contained and from which it can be readily extracted. It appears to me that the opal may have been the original deposit in a steam cavity. In other cases the opal fills up the entire space and is intimately joined to the rock itself, sometimes with a surrounding iron stain and again with the rock absolutely unaltered. The mode of occurrence makes no difference in the quality of the stone, and a first-grade opal may be found under any of the conditions obtaining throughout the mine.

Once a week or so the output of rough stones is taken into Queretaro and handed over to the polishers. The first operation is the rough shaping on an ordinary large grindstone. When the stone has been ground to the largest possible size consistent with symmetry and beauty, it is passed on to the sandpapering machine and is given a final polish by vigorous rubbing on soft, rough leather, and the opal is ready for market.

Utah as a Metal Producer

Statistics recently issued by the United States Geological Survey in regard to the lead, copper, silver and gold production of the country for 1910 show that Utah was second among the States in the production of lead, fourth in copper, third in silver and sixth in gold. The lead production was exceeded by that of Idaho; Arizona, Montana and Michigan produced more copper. The production of silver was exceeded by that of Nevada and Montana, and the production of gold in Colorado, California and Nevada was greater than that of Utah.

Raritan Sues Government for Platinum

The Raritan Copper Works, of Perth Amboy, N. J., have begun suit to recover a quantity of platinum which, it is claimed, was contained in bullion delivered to the United States Assay Office in New York and to the mint in Philadelphia to be parted. The gold and silver were accounted for, but it is charged that the platinum was not returned. The quantity of that metal contained in the bullion is not known to the company. This is an unusual case, no proceeding of the kind having ever been brought.

Consul George E. Chamberlin, of Cork, reports that a \$73,000 company is being formed to acquire a mining lease of the Ardtully copper-silver-lead mines situated between Kilgarvan and Kenmare, in the county of Kerry, Ireland. The property consists of 14 acres of land and the mining rights of adjoining property, comprising 265 acres.

British-Canadian Power Company

The rich silver mines of the Cobalt district were discovered in 1904, and although at first it was believed that they were not extensive deposits, the camp has since developed into one of the most important of the world's producers of silver. During the year 1910 approximately 30,000,000 oz. were produced and the production for 1911 is estimated at about 35,000,000 ounces.

STEAM POWER ABOUT \$160 PER HORSE-POWER-YEAR

One of the most interesting features of this camp is the development of power on a large scale, for supplying air and electricity to the various mines. The camp embraces an area of approximately seven square miles, in which there are 30 shipping mines besides several nonshippers, and it lends itself readily to the large development of power. The distance of the Cobalt district from the coal-producing centers is great and as

By G. C. Bateman*

One of several water-power developments which have cut Cobalt power costs from about \$160 to \$50 per horsepower-year. Electric power transmitted at 44,000 volts. Bleeder valves in air lines warmed by electric heaters.

*Mining engineer, Dome mines, South Porcupine, Ont.

river, distant about 25 miles from Cobalt.

The main power dam is 860 ft. long and 50 ft. high at its deepest point. It raises the water 40 ft. above its former high level and gives a working head of

rated at 180 h.p., 475 r.p.m. To insure perfect regulation, high-power governors are installed. The current is three-phase, 60-cycle, and is generated at a pressure of 2200 volts. By the use of step-up transformers the pressure is increased to 44,000 volts, at which potential it is transmitted to the power stations at Cobalt and South Lorrain.

ALUMINUM TRANSMISSION WIRES USED

There are two separate three-phase transmission lines 35 ft. apart over a right-of-way 135 ft. wide. This right-of-way has been entirely cleared, and all tall trees on each side have been cut down. The conductors are stranded aluminum cables, and the poles are equipped with high-tension porcelain insulators that were subjected to the most severe tests before being used. The conductors on each pole line are of sufficient capacity to carry the whole power load, thus eliminating any danger of a shut-



POWER HOUSE AND MAIN CONCRETE DAM OF BRITISH CANADIAN POWER COMPANY, ON MATABITCHEWAN RIVER

transportation is all-rail, the cost at the mines is necessarily high, averaging between \$6 and \$6.50 per ton; consequently coal-generated power is costly. A series of tests run at the different mines put the average cost for the camp at between \$150 and \$175 per horsepower-year.

TOTAL DEVELOPMENT, 15,000 HORSE-POWER

The cost of power became a serious consideration in the cost of mining and several companies were formed to develop the large water powers near the district, for the purpose of supplying air and electricity to the mines. Among these was the British-Canadian Power Company, formerly known as the Mines Power, Ltd., which was promoted by E. A. Wallberg and F. J. Bell, of Montreal. This company secured a valuable water power on the Matabitchewan

312 ft. It is estimated that a total of 15,000 horsepower can be developed. Several lakes above the dam have been utilized for storage purposes, so as to eliminate as far as possible the danger of a water shortage.

By means of an intake canal the water is diverted to two steel penstocks, each 5 ft. in diameter and 1075 ft. in length. Each penstock supplies water to two turbines. The power house is a solid concrete structure 57x105 ft. and is fitted with travelling cranes. The turbines are of the horizontal reaction type, consisting of a single runner in a spiral case with a speed of 600 r.p.m. and rated at 2750 b.h.p. each.

The electrical equipment consists of four 1875 kw. alternating-current generators, direct connected to the turbines. There are two exciters, each direct connected to a Doble impulse water wheel,

down due to a break in the line. The main transmission line is equipped with a private telephone system and patrolmen are stationed at intervals.

At the Cobalt camp two brick and concrete substations have been erected, one at Cobalt lake with a capacity of 5500 h.p. and the other at Brady lake with a capacity of 3200 h.p. Each substation is equipped with all the necessary step-down transformers, lightning arresters, switching devices, etc. Electric current is delivered to the customer at 2200 volts, and by means of line transformers is reduced to 550 volts for motor service and 110 volts for lighting.

A substation was also built at South Lorrain to supply electric power to the mines of that section, which was destroyed by fire a short time ago, but has since been replaced by a concrete fire-proof structure.

BOTH METER AND FLAT RATES USED

Power is sold to the mines on a meter basis, with prices varying for the amount consumed and the class of service, or it is sold at the flat rate of \$50 per horsepower-year. This rate is high in comparison with prices for power in other sections of the country, but is eminently fair when the immense cost of the undertaking is considered, and the fact that a much shorter life must be looked for than would be the case were the plant supplying power for industrial purposes.

At both the Brady Lake and Cobalt Lake substations, are identical compressor plants, each consisting of two 2-stage air compressors, each having a capacity of 5000 cu.ft. of free air per min., and each driven by a 1000-h.p. motor. When the compressors are running at full load they each take 1020 h.p. The compressors are equipped with the regular intercoolers, and each substation is equipped with an extra large water after-cooling system. From this the air passes through a separator, and from there through an air-cooling system. This latter system is not used in



TRANSMISSION LINES TO COBALT

the summer, as the high temperature renders it useless, but it is in continuous use in the winter time.

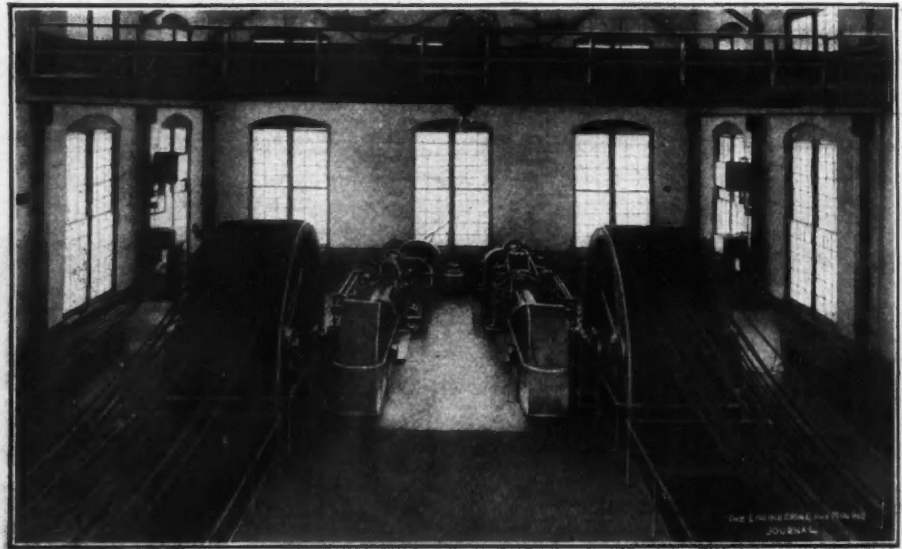
The air is delivered through steel pipes, with diameters varying from 3 to 10 inches, and the two substations are connected by a 10-in. main. All the pipes are lap-welded, and the larger sizes come in 40-ft. lengths. They are fitted with wrought-iron forged flanges welded on, and each pipe has a weld in the cross-section made by the oxyacetylene process, and they have been tested to a pressure of 300 lb. per sq.in. The pipes are coated inside and out with "Dr. Smith's" solution. All fittings, valves, etc., are made of steel.

PIPES ZIGZAGGED; NO EXPANSION JOINTS

When this line was first under consideration it was decided not to install expansion joints, as they were not considered sufficiently reliable. To take

care of the expansion and contraction, which are excessive, the lines were zig-zagged and, although the plant has been in operation for two years, no trouble has as yet been experienced. In all there are about 15 miles of main lines and branches.

In the pipe lines there is at times a small accumulation of water. This is not of sufficient quantity to affect the mines, but as the water collects in the bottom of the hollows of the lines, it would freeze in the winter time and stop up the pipes. At the lowest point of each hollow, there is a $\frac{3}{4}$ -in. cock that is left open just enough to allow the water to escape. In the winter time the pipe at the point where the cock is inserted is warmed by an electric heater, thus preventing the water from freezing, and keeping the cock open. The air is delivered to the mines at 100-lb. pres-



TWO 1000-H.P. COMPRESSORS OF BRITISH CANADIAN POWER COMPANY

sure and is sold at the rate of \$2 per drill per shift.

Operations on this plant were started in the first part of June, 1909, and the first power was turned on March 17, 1910, which is an enviable record for a plant of this size. Air and electric service is now being supplied to 37 mines and concentrators. In addition to this the company supplies power for the electric railway between Cobalt and Haileybury, and furnishes electricity at wholesale rates to the Cobalt Light, Power and Water Company, which resells to the town of Cobalt.

Venetian red is made in various ways, such as by grinding red iron oxide with gypsum or by roasting ferrous sulphate with lime and grinding the residue. In either case the red is a mixture of iron oxide and calcium sulphate.

Nickel in Virginia

SPECIAL CORRESPONDENCE

A deed was recently recorded at Floyd Court House by the United Chemical and Nickel Corporation, an organization chartered about six years ago under the laws of Virginia, whereby the company obtained in fee simple the mineral rights on 15 tracts of land, 13 in Floyd and two in Roanoke county. These tracts include the area exploited previously by the Virginia Nickel Company, openings having been made at several places in the vicinity of Hemlock, Floyd county. Probably the principal one is on Lick fork, just above its confluence with Flat fork, about 10 miles by wagon road south from Shawsville, a station on the Norfolk & Western railroad. A visit to this spot several months ago found no active mining operations and no evidence of recent work. The mining previously done con-

sisted of a small cut in the hillside from which nickel-bearing pyrrhotite, carrying some chalcopryite, had been obtained. Little ore remained in place, but many pieces were scattered about. An old slope, filled with water, is near this small cut, and it was reported that splendid ore had been found there by those who sank it for prospecting purposes.

Authentic analyses do not seem to be available, but one report gives the nickel content as 1.75 per cent., less than 1 per cent. copper and less than 0.4 per cent. cobalt. The new holding corporation is credited with several years' extensive prospecting, during which higher-grade nickel ore may have been found. There is talk already of a railroad into the vicinity, the route following the South fork of the Roanoke river. Such a line would pass the well known Alleghany springs and the Crockett arsenic lithia spring, and would extend to within four miles of the Brinton arsenic mine.

Efficiency Engineering in Lake Mines

By P. B. McDonald*

The success of what are known as "scientific-management" systems, as introduced by Frederick W. Taylor in certain manufacturing and contracting establishments in the East, has led to their trial in the Lake Superior mining districts, especially underground. It was argued that if the need of greater efficiency had been felt in well lighted shops where the workmen had always been watched and instructed to advantage, then it was doubly necessary in the scattered workings of a dark mine, where attention to details and close figuring had never been satisfactorily carried out.

POOR METAL MARKETS AN EFFICIENCY STIMULUS

A second reason for the initiation of new methods has been furnished by the continued dull state of the metal markets, and the alacrity with which mining companies took up the experiments was in direct proportion to the narrowness of the margin of profit on their product. Thus in the Lake copper country where, it has been pointed out, only nine mines out of about 35 are paying dividends, the interest taken was immediate and thorough; for when ore contains but 1 per cent. of copper, or 20 lb., worth 12c. per lb., the value of a ton is but \$2.40; and if the depth of the mine is several thousand feet, necessitating a high hoisting cost and expensive machinery, it is apparent why any method promising increased efficiency met a ready reception.

The iron-mining region was not so quick to take up the new ideas, but the independent hard-ore operators of Michigan are beginning to be impressed with the soundness of the theories and their applicability to practice. The necessity for economy on the old ranges is accentuated by the gradual exhaustion of the high-grade ore lying near the surface, and the development of medium-grade and nonbessemer deposits discovered at depth by diamond drilling.

The general low mining costs in the Mesabi soft-ore mines do not offer an especially attractive field for scientific management, but it seems likely, however, that as efficiency engineering comes to be better understood, it will be adopted to some degree in most of the underground mines of the district, applying not so much to drilling and breaking ground as in Michigan, but to the cycle of operations necessary to put the ore on the surface, including blasting, shoveling, timbering and the extraction of a maximum amount of ore without causing the sand to run in. It is stated by men who have observed conditions in Europe that mining in America is yet in its bonanza

Scientific management now being tried in the Lake Superior region, with good results. Usually only 40 per cent. of a drill man's time is spent in drilling. A few efficiency suggestions.

*Mining engineer, Iron River, Mich.

stage, and that a much greater economy is possible than is now practised.

WHAT EFFICIENCY ENGINEERING IS

Efficiency engineering as applied to mining aims to extract the greatest output at a minimum cost. This end is secured by observation and systematic tabulation of the records of workmen under various conditions, after which delays and waste movements are eliminated as much as is possible, and the men are taught to use the most productive method, which is thus made standard. The observations should be taken by persons who can devote their entire time to the matter, and a stopwatch has been recommended for accurate results. It has been found that apparently trivial points, which at first would seem too small to bother with, have retarded the efficiency of a body of men several per cent. Thus, referring to Mr. Taylor's much quoted statements, a small variation in the size of shovel furnished the workmen made a considerable difference in the quantity shoveled; and by allowing men loading pig iron on flat cars to take short, frequent rests, the amount loaded per man per day was about trebled. Motion study plays an important part in the process, and if the operations necessary to lay a brick can be reduced by elimination of waste movements, such as stooping over to pick up the brick, the number that can be laid in a day will be increased astonishingly.

Mr. Taylor also lays stress on the allotting of contracts to each man separately wherever possible, so that each will know at the end of a day's work how much he has made. This keeping of each man's record and output requires considerable clerical work, but makes each man a separate unit who will get paid for just what he does, as opposed to working in gangs where "everyone tends to assume the pace of the poorest workman."

Efficiency engineering, then, aims to give each man an incentive to do the best individual work he is capable of;

to train him to cut out all unnecessary movements and to conserve his energy for motions which count; and it requires that the most convenient tools be supplied, and the work be so planned that no waste of time occurs between different operations, for instance, that miners shall not be delayed by waiting for muckers to clean out a place of work.

APPLICATION TO MINING

Mine foremen and mining captains have in the past done most of the "efficiency engineering" underground. It is recognized, however, that a foreman has not time to go into the matter as deeply as is desirable, and to keep tabulated records of individual jobs.

In the Michigan mines where machine drilling is an expensive item, as opposed to Mesabi practice where hand augers are generally used, the attention paid to breaking ground has been minute. Different types of drill machines have been experimented with and alterations suggested to the manufacturers. It was soon apparent that one-man drills which would save the wages of a helper were an end to strive for, and already one-man machines are being installed. Also it was discovered that different drills of the same diameter cylinder with the same air pressure do not drill with equal speeds; some have types of valves which are cumbersome and slow, so that the number of blows struck per minute is but a fraction of that of some other type; others cushion the blow and weaken the impact; others "wire draw" the incoming air through tortuous passages so that much of the force is lost. Pressure cards from rock drills should in theory be approximate rectangles, because they receive air for the full stroke; as a matter of fact, they more nearly resemble cards from an engine cutting off at one-fourth stroke, due to "wire drawing" in the inlet passages.

FAIRNESS WITH MEN A NECESSITY FOR SCIENTIFIC MANAGEMENT

Miners did not take readily to running one-man machines, but when paid a portion of the saving they made for the company, they became more willing. There is a strong sentiment among miners, in cases justifiable, against such an innovation as working alone, because many companies do not share with the men whatever saving the new order may bring about.

In cases where one-man drills have been successfully installed, it has been found that one good miner with a light, quick machine can equal and in some cases exceed, in speed of drifting, the

rate of two men with a heavy, large cylinder, tappet-valve drill. It is sometimes necessary to furnish a 1-in. water-line tapped into the pump discharge, or an improved squirt gun for flushing out the drill chippings; and both single-screw and double-screw columns should be available, so as to use whichever is handier.

HOW MUCH OF A MINER'S SHIFT IS EFFECTIVE?

In mines where the miners do no shoveling or tramping, but merely drilling and blasting, as in most of the Michigan iron mines, detailed observations have been taken to determine what part of the time was spent with the drill actually reciprocating. It was found that the subordinate operations of blasting, changing drill steel, rigging up and rigging down, cleaning out sticky holes, etc., consumed over one-half of the miners' time, and that hardly 40 per cent. of a day's shift was spent actually drilling. A considerable percentage was taken up by needless delays, such as hunting for tools or sharp drill steel and waiting for smoke to clear because of only having one place in which to work. In fact, the number and aggregate of incidents tending to delay the miner is astonishing; some could be obviated altogether by better management while others could be materially lessened.

REPAIRS AND TOOLS

Some operators boast of their low repair bill per drill machine; others seek to increase it. It is cheaper to repair a worn drill part at a cost of 50c. in machine-shop labor, than to reduce a miner's efficiency 10 per cent. for a week. One mine superintendent makes it a practice to discard immediately any part of a rock drill which is worn at all; his repair bill is large, but his mining cost is reduced an amount several times greater. Some operators try to economize on tools given out underground; as a result, miners are seriously delayed by having to search for the articles and use all kinds of time-taking makeshifts to get along; for instance, a certain iron mine had but one ax underground and if a miner wanted to split a wedge, he had to climb a level or two for the ax or split the block with a shovel.

It is good economy to keep an ample supply of drill steel on all levels; also to furnish such incidentals as hardwood wedges for rigging up a column. It may delay the miner only a few minutes to search for any one article, but a few minutes several times per day among a large force of men, will in a year amount to a considerable sum; as one mining man expressed it, "it isn't the

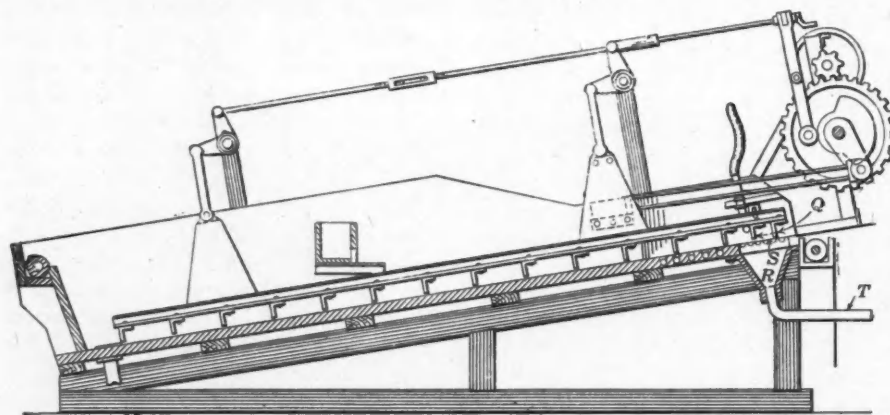
first 75 per cent. efficiency which counts; anyone can secure that; but it's the last 10 or 15c. a ton which makes the profit."

EFFICIENCY ENGINEERING CANNOT BE HASTILY INSTALLED

Efficiency-engineering methods cannot be installed to work successfully in a week, but usually require several years for good results. The principal difficulty is in educating the miners to adapt themselves to the new ideas; this part of the process is one requiring considerable hard work, tact and a disposition to share with the men whatever saving is effected. If the labor cost in drifting can be reduced \$2 per ft. by subjecting the miners to the hardship of working alone on one-man drills, the company is still ahead if it gives the miner 75c. per ft. of the saving.

Dorr Classifier Improvement

Ordinarily in the use of the Dorr classifier the sard is discharged with about 26 per cent. moisture. With the object of reducing the moisture in the discharge



DORR CLASSIFIER, SHOWING SUCTION BOX

to about 10 per cent., Mr. Dorr has patented (U. S. Pat. 996,624, July 4, 1911) a device to be used in connection with his classifier or a similar apparatus. By the action of the rabblers *Q*, the sand is spread out over the reticulated cover *S* of the suction box *R*, and the moisture removed through pipe *T*, which may be connected to an exhaust pump.

Cryolite

Cryolite has been found in commercial quantities only at Ivigtut, an Eskimo hamlet on the southern coast of Greenland, in a latitude 61 deg. north. Minerals containing cryolite have been found near Pikes Peak, Colo., but not in paying quantities. The cryolite deposit at Ivigtut is reported to be a solid mass, the surface dimensions of about 200x600 ft., and it has been worked as an opencut to a depth of about 150

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ft. The deposit widens with depth and the depth of the deposit is unknown.

It has been suggested that the cryolite is of volcanic origin, since large pieces of granite from the surrounding rock mass are occasionally found imbedded in it, but if such is the case it is difficult to explain the presence of crystallized siderite, which decomposes at a temperature below the fusing point of cryolite, which is about 900 deg. Centigrade.

Cryolite was formerly used to produce soda and alum, but other and cheaper sources of these materials have displaced cryolite from this particular field. The more important uses at present for cryolite are in the manufacture of opaque glass for the enameling of iron ware, in the metallurgy of aluminum and as a flux in the manufacture of white portland cement.

The preparation of cryolite consists in the hand picking of the large pure lumps and in a mechanical cleaning by means of chisels of the larger lumps of the comparatively pure material.

The reject from these operations goes

through jigs and then through magnetic separators which take out first the magnetite and later separate cryolite and galena as one product from sphalerite and chalcopryrite, and siderite. The purified cryolite is sold either in lump, or ground to a fine powder.

A careful grinding allows the separation of a small amount of quartz still present, as the quartz is not ground easily and can be removed by subsequent sifting. The imports into the United States fell off from 1278 long tons valued at \$18,427 in 1909 to 36 long tons valued at \$2343 in 1910. The refined cryolite sells in carload lots at about \$140 per ton.

The chief uses of bauxite are as raw material in the production of metallic aluminum, in the manufacture of aluminum salts, of artificial abrasives and of bauxite brick, by far the most important being the first.

First Aid to Mining Machinery—III

By Henry M. Lane*

A description of the methods of making patterns for cores for iron castings, making and using the cores, the qualities essential for good molding sand, and methods of drying cores and dry-sand molds.

There is a great variety of patterns for making iron castings which require some form of cored work. Such castings have openings or holes in them which it is difficult to form with the same body of sand from which the mold is formed. In some cases cores are formed from the molding sand, as will be shown herein, but generally where a fairly thick casting is penetrated by a hole it is best to make the core as a separate body of sand and set it into the mold.

Fig. 1 illustrates a simple roller 12 in. diameter, and with a 2½-in. face. This has to be bored through the center, finished on both sides of the hub and turned on the outer face. The surfaces to be finished are marked with a small letter *f*, as this is the symbol generally used by draftsmen for indicating finish. Where finish is required the pattern-maker usually adds ⅛ in. of metal.

TAPERING OF PATTERNS

In order to draw a pattern from the sand it is necessary to have the surfaces slightly tapered, and this necessitates still greater additions to certain dimensions of the pattern. The allowance for drawing the pattern from the sand is called "draft" and is usually 1/16 in. per foot. The pattern for the casting shown in Fig. 1 may be made in several ways. A solid pattern may be made and arranged to leave a green-sand core for the hub, or a solid pattern with core prints and a dry-sand core for the hub, or a split pattern may be used. Each one of these will be illustrated and their relative advantages discussed.

The solid pattern constructed for leaving the green-sand core is shown in Fig. 2; the dimensions show the allowances made. It will be noticed that the pattern is 12⅜ in. diameter at the small end; ⅛ in. allowance has been made for shrinkage as the metal will shrink ⅛ in. per ft. and ⅛ in. has been allowed on each face for finish. The large end of the pattern is made 12½ in., the extra ⅛ in. being for draft. As the diameter of this piece is fairly large, 1/16 in. on the side would give sufficient draft. The hub is bored hollow, as shown, being given a taper of ¼ or ⅛ in. on the side, it being necessary to allow more draft in a case of this kind where the sand would have a tendency to stick to the pattern and be broken away from the mold and lifted with the pattern.

METHOD OF MOLDING

The method of molding used with a solid pattern is illustrated in Fig. 4. The pattern is placed on the bottom board *B*, and the drag half of the flask *A* placed

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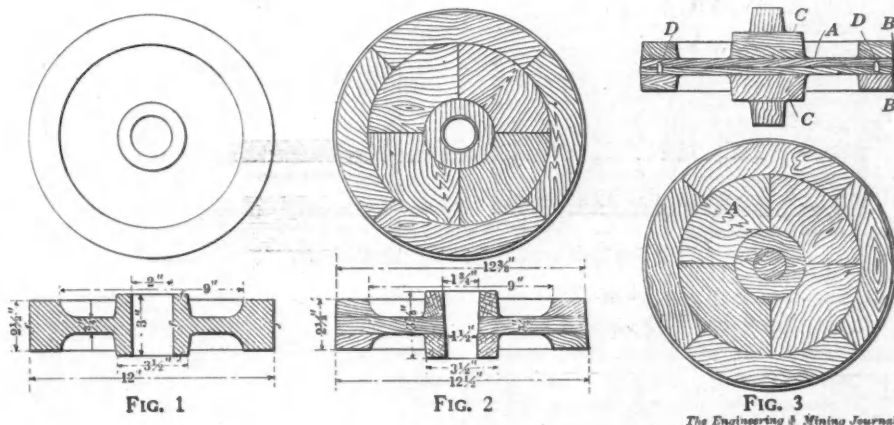
about it. Sand is then riddled or sifted on the face of the pattern to the depth of ½ in. and the mold filled with sifted sand. The core inside of the hub should be carefully tucked and the rest of the sand rammed.

Care should be taken to peen the sand well around the edges of the flask, but at the same time the mold should not be rammed as hard as possible, since too hard ramming packs the sand so tightly

shown in Fig. 5. These nails serve to hold the green-sand core together when the pattern is drawn off.

The upper surface of the drag is then dusted over with parting sand and the cope flask placed in position. The sprue pin is set as shown at *A*, and some facing sand riddled on the face of the pattern. The flask is then shoveled full of riddled sand and rammed. If the flask is more than six inches deep it is best to put about six inches of sand in the flask first, peen it and then add more sand and repeat the peening operation. The spaces in the cope which project into the hollow between the hub and the rim of the wheel must be rammed a little harder than the rest of the mold, so that it will lift freely. To prevent blowing, a vent wire should be run down into this part of the mold as indicated at *B*, making a series of holes all the way around the pattern and not more than 1½ in. apart.

After the mold has been rammed, struck off and vented, the sprue pin *A* is removed and the cope lifted off. The pattern is then rapped with a mallet to loosen it from the sand and is lifted out.



WOODEN PATTERNS FOR A SIMPLE ROLLER

that the gases cannot escape, and as a consequence the gases from the mold would be forced into the metal, resulting in a spoiled casting. The foundryman would call this blowing, and the holes formed by the gases "blow-holes."

Owing to the fact that the hub in this case projects beyond the face of the rim it is necessary to cut out the center of the bottom board as shown at *C*, and to tack a piece on the under side of it to support the sand in the hub. After the drag has been rammed a board is put on its upper surface, clamped in place, and the whole rolled over. The molding board is removed and the sand is then struck level with the top of the hub, and two or three nails shoved down into the hub as indicated in the section

The gate connecting the sprue with the mold is then cut and the cope replaced, as shown in Fig. 6. The mold is now ready for the metal. This method of molding does away with the necessity of any dry-sand cores, but the taper which must be allowed on the green-sand core necessitates an extra amount of machining work in boring the casting.

MAKING WOODEN PATTERNS

The pattern for making this casting with a dry-sand core is shown in Fig. 7. In this case two core prints, *A* and *B*, have been attached to the faces of the hub as shown. The diameter of these core prints where they join the casting should be 1¾ in., allowing ⅛ in. on each side for finish in boring the hub. The

core prints are usually at least two-thirds as high as their largest diameter, and should have a taper of about $\frac{1}{8}$ in. on a side. In some cases the lower core print is given less taper than the upper, but for ordinary work it is best to taper them both the same.

At this point it may be well to call attention to the different methods which may be used in making the rim of the solid pattern, as shown in Figs. 2 and 7. The web of the pattern may be made of one solid board if the pattern is of a temporary nature; but if it is to be kept for future use it is best to make the rim of at least four segments, so that the

segments to exact size inside and out and also tapering them and securing them to the web as indicated in Fig. 9. The fillets are then worked in with beeswax, as shown at A and B, Fig. 9. For temporary work, fillets are sometimes made of plaster of paris, or of cement, but wax is generally considered best, because it does not break out as does plaster or cement. The pattern should be given one or more coats of shellac varnish and sandpapered lightly before it is sent to the molder. The reason for this is that if the pattern is not protected it will absorb moisture from the sand, become rough, and it will be impossible to draw

MAKING DRY-SAND CORES

For making the dry-sand core for the center of the mold a half core box as shown in Fig. 10 should be made. The easiest way to make this is to cut five pieces of wood to be glued together to form the box. The central piece A should have a length equal to the straight part of the core, which corresponds to the thickness of the hub. The sections B B should have a length slightly less than the length of the core prints. In fact, the core prints should be about $\frac{1}{4}$ in. longer than the sections B B, so that the print will come to a bearing on

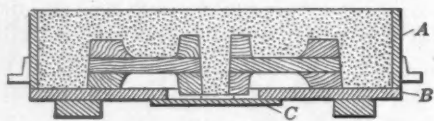


FIG. 4

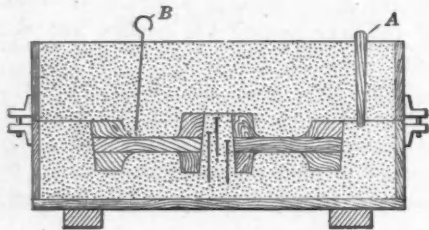


FIG. 5

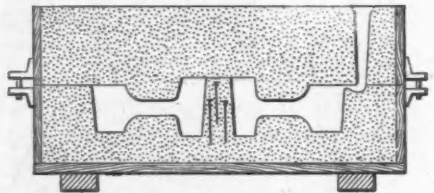


FIG. 6

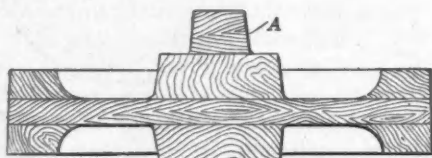


FIG. 7

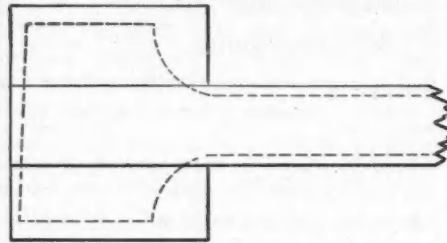


FIG. 8

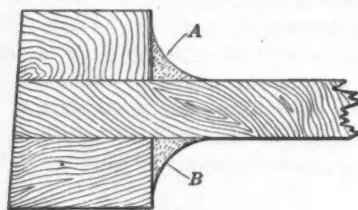


FIG. 9

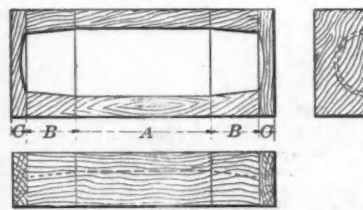


FIG. 10

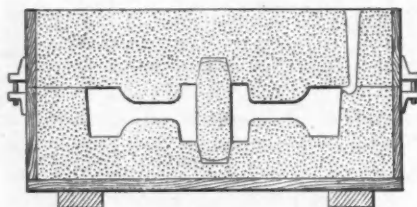


FIG. 11

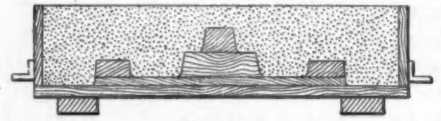


FIG. 12

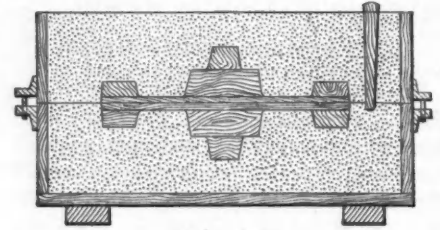


FIG. 13

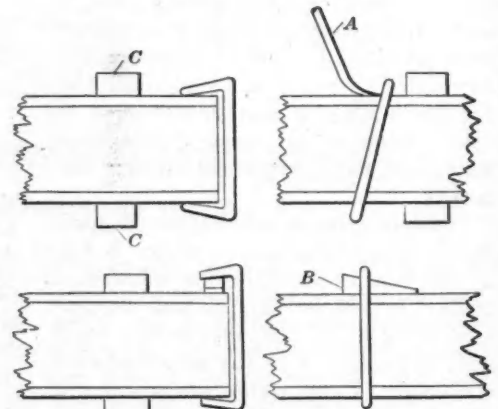


FIG. 14
The Engineering & Mining Journal

MOLDING ROLLERS FROM PATTERNS WITHOUT AND WITH CORE PRINTS

grain of the wood in each segment will run in approximately a radial direction. The reason for this is that lumber shrinks across the grain, but has little appreciable shrinkage in the direction of the grain. The rim may be made in segments and glued on, as shown in the upper part of Fig. 2, and in cross-section in Fig. 8. The pattern may then be turned out as indicated by the dotted lines in Fig. 8. The fillet on the inside of the rim is in this case turned from solid stock.

In case no turning lathe is available the pattern may be made by sawing the

it from the sand satisfactorily. It is not necessary nor desirable to give patterns a piano finish, as they draw better from the sand if they are simply protected from the sand and still show sandpaper marks. An absolutely polished pattern lies to the sand so closely that it is nearly impossible for the air to find its way in as the pattern is drawn. This is only true in the case of very fine molding sands when fine work is wanted, but in no case is it necessary to have highly finished patterns, the important point being to so cover the surface as to prevent it from absorbing moisture.

the tapered socket and not set down tight at the end of the print. The end pieces C C have to be cut out as shown, to allow draft at the ends of the core box, for if this is not done the core cannot be turned out without tearing up at the ends.

The separate sections may be made by laying out the circles on the opposite ends and then cutting out the stock with gouges. After the parts are cut out they are assembled, glued, screwed together, the entire box given two or more coats of shellac varnish and lightly sandpapered.

In making the core a half core is made by packing sand in the box; this is then turned out on an iron plate for baking. Two half cores after baking are pasted together to form a single core. Other forms of core boxes are sometimes used, which will be described later, but for the job in hand this type is all right.

The method of molding the soft pattern with core prints is the same as that shown in Figs. 4 and 5, one core print being allowed to project through a hole in the center of the board *B* while the drag is being rammed. After the mold is completed and the gate cut, the core is set in position as shown in Fig. 11; the cope is then closed on it as shown; then the mold is ready for casting.

DESIGN OF SPLIT PATTERNS

If a large number of these rollers were required it would pay to make a split pattern as shown in Fig. 3. This is the best pattern for this type of work, but it is also the most expensive. The use of a split pattern, however, simplifies the molding. The central web *A* should be made of at least four pieces butted together at the center and so arranged that the grain in each piece runs radially. To these web pieces the rim segments *B B* are glued, each half of the pattern being made up separately. The hubs are attached to the center of the webs as shown at *C C*. The rim segments *B B* and the hubs *C C* serve to bind together the segments of the rim *A*. Each half of the pattern is turned separately, and the two are then joined by dowel pins as shown at *D D*. These dowel pins should be so spaced that it is impossible to put the pattern together in any but the right way. Where an attempt is made to place them on radial lines one of them is sometimes misplaced 1/32 in. or more, so that if the parts of the pattern are put together in the reverse position the faces will not correspond and there will be what the foundryman calls "shift at the parting." By purposely placing the pins so that if the pattern be put together in the wrong way there will be a shift of an inch or more, the error is immediately visible.

Molding with a split pattern is simplified, as no hole in the bottom board is required. The operations are shown in Figs. 12 and 13. The part of the pattern which does not contain the pins is laid on the bottom board as shown in Fig. 12, and the drag rammed up. A board is then clamped on the top of the drag and the whole rolled over. The board on the face of the pattern is then removed and the second half of the pattern placed on the first half, the pins guiding it into its proper position. Parting sand is then sprinkled over the surface of the mold, the sprue pin set, the cope filled and rammed as shown in

Fig. 13. The sprue pin is then drawn and the cope lifted off. In this case half the pattern is drawn from the cope and the other half from the drag, the depth of the draw being just half what it was in the previous case.

After the pattern is drawn the core is set just as it was in Fig. 11, and the mold closed, when it is ready for pouring. When rolling a flask over, it is necessary to clamp a board to the bottom of the flask. This may be done with an ordinary U-clamp, as shown in Fig. 14. At the top of the illustration the clamp is shown secured by cramping over. The pinch bar *A* is used to crowd one end of the clamp to one side, so that the clamp takes a diagonal position as shown; this action tightens it to the bottom board.

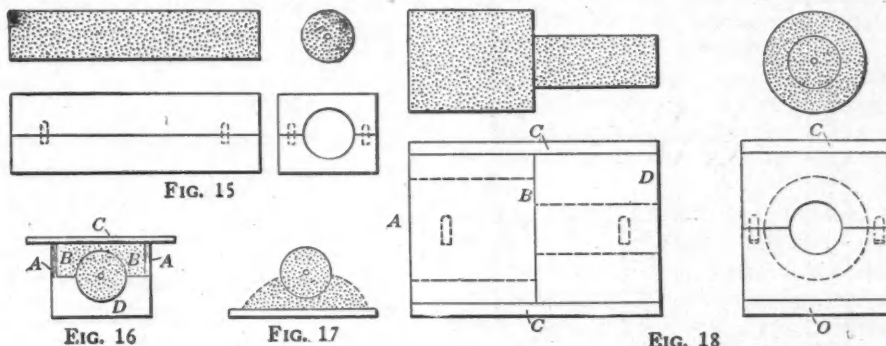
In some cases wedging has to be resorted to. This is illustrated in the lower part of the figure, the wedge *B* being forced under one end of the clamp. Where wedges are used, however, the height of the clamp above the bottom board is increased and it is sometimes necessary to roll over on a block or board in order to prevent the clamps

for rough heavy work coarse sands and even gravels are employed. It is no uncommon thing to find pebbles a quarter of an inch in diameter in heavy work. Of course in such cases the facing must be made of finer sand.

PREPARING THE MOLDING SAND

To make molding sand efficient the clay which is the bond must be thoroughly mixed through the material. In most regions a good quality of natural molding sand can be found, but sometimes it becomes necessary to make the molding sand from sharp sand and clay. In such a case the ingredients should be thoroughly mixed by shoveling. First a layer of sand should be spread and on this a layer of finely ground clay, then another layer of sand, and so on. The whole mass should then be shoveled over several times so as to thoroughly mix it and it is well to tramp it with the feet each time between shoveling it over or to ram it with the butt rammer.

The material should finally be wet with water to the right temper so that when a handful is pressed it will form a



METHOD OF USING CORE BOXES

from striking the floor. The battens on the bottom boards, as shown at *C C*, should be of sufficient thickness so that when the mold is rolled over the clamps do not strike the floor.

MOLDING SANDS

For green-sand molding the sand should contain at least 80 per cent. silica and 10 to 20 per cent. clay. The balance is usually made up of impurities such as iron oxide, lime, potash and soda salts. Lime, potash and soda salts are particularly objectionable as they tend to make the sand fusible in the presence of molten metal so that it will melt, form a hard scale and stick to the casting. Iron oxide in the absence of lime, potash or soda is not particularly objectionable but in their presence becomes so.

The grains of silica in the molding sand should be of sufficient size so that there is ample passage between them to permit the escape of the steam and gases from the mold when the metal is poured. For light work and delicate iron castings comparatively fine sands are used, while

ball which does not feel wet and sticky on the surface but which still retains its shape when the pressure of the hand is released. Usually for gray-iron work from 6 to 8 per cent. moisture by weight is sufficient. A little experience in handling molding sand will soon enable one to judge accurately the temper.

All molding sand after thorough mixing and tempering should be passed through a riddle at least once. Generally the foundryman calls any screen having eight or less meshes per linear inch a riddle, and a screen having more than eight meshes per inch a sieve. A No. 4 riddle is one which has four meshes per linear inch. For ordinary mixing a No. 4 riddle is fine enough; in fact, a No. 4 or No. 5 riddle is generally used for facing sand for medium work. For simple mixing of the sand a No. 2 riddle is sometimes used.

In selecting sand from which to compound molding sand it is well to avoid material containing an excess of shale, or limestone grains. If possible the grains of sand should be composed of

pure silica. Sand of sufficiently fine quality as a base for making molding sand may be found in the bars of almost any stream or river and the clay is available practically everywhere. Some clays, however, are hardly refractory enough for good work.

In green-sand molding the aim is to depend on the clay for the natural bond and to use such a quantity of water in tempering that the sand will stand while the mold is being poured, but at the same time there will not be sufficient moisture present to form an excess of steam or cause an explosion. The molding sand must be sufficiently porous to carry off the steam formed. Some natural sands containing clay have to be opened or made more porous by the addition of sharp sand. The porosity of a sand may be judged by forming a ball by pressing in the hands and then seeing if the breath can be forced through the sand by placing the lips against the ball. If the breath can be forced through

be cooked into the form of cooked paste, but few foundrymen take the trouble to do this, simply mixing the dry flour with the sand, adding water and cutting the mass over several times with a shovel.

FACING MIXTURE

A dry-sand facing mixture for dry-sand molds recommended by Boland is as follows: Silica sand or fine sand, 8; molding sand, 2; flour, 1 part. The ingredients should be mixed dry and wet with a thin clay wash. More modern mixtures contain less flour or none at all, the mixture being made of silica sand, molding sand, clay wash and glutrin. In a dry-sand mixture the glutrin is generally strong enough if used in the ratio of 1:75 parts sand by volume.

In making dry-sand molds the sand next the pattern is what is known as dry-sand facing. This is practically a core mixture consisting of sharp sand, molding sand and glutrin or glutrin and

be made in dry-sand molds far more easily than in green sand, on account of the fact that the ramming is not so delicate it does not affect the quality of the casting so much and also because the castings usually vent more freely.

MATERIAL FOR MAKING CORES

Cores are made from a variety of materials. A core should be of such a nature that it vents even more freely than a mold, on account of the fact that being surrounded by metal, except at the ends or prints, the gas has to travel through the body of the core for a considerable distance. Long, delicate or intricate cores are generally made of clear, sharp sand, free from clay or loam, mixed with linseed oil or some similar drying oil, as corn oil, cottonseed oil, Soybean oil, or China-wood oil.

A number of manufacturers make blended core oils containing one or more of the above mentioned ingredients to which has been added rosin, neutral oil or other cheap material. Oil-sand cores are made by mixing the oil with the sand in proportions varying from one part oil to 30 to 100 parts sand. Oil-sand cores have no strength when green and hence have to be supported throughout their entire length when being dried. In manufacturing works where they are regularly used, special metal driers or core plates are provided for supporting these cores. On account of the fact that oil-sand cores must be so delicately supported during drying they are not specially suited for emergency foundry work.

A core containing flour as a binder has considerable green strength and does not have to be as carefully supported as an oil-sand core. If the core sand contains some clay, and glutrin or molasses is used as a binder the core will also possess some green strength, that is, strength before baking. Glutrin or molasses is ordinarily used in ratios of from one part of the binder to 30 parts of sand to as high as one part of binder to 100 parts of sand, depending upon the nature of the sand and the amount of clay it contains. The more clay the sand contains the less glutrin or molasses is necessary.

THE USE OF CORE BOXES

A core box for making an ordinary round core of the solid type is shown in Fig. 15. The box is in halves and the two parts are guided together by pins as shown. In the illustration the core is shown at the top and the box beneath it. With ordinary mixtures, if the core has a length which does not exceed six or eight times its diameter it can generally be dried on end standing on a plate. If, however, the core does not contain much green binder it may squat when the heat strikes it so as to

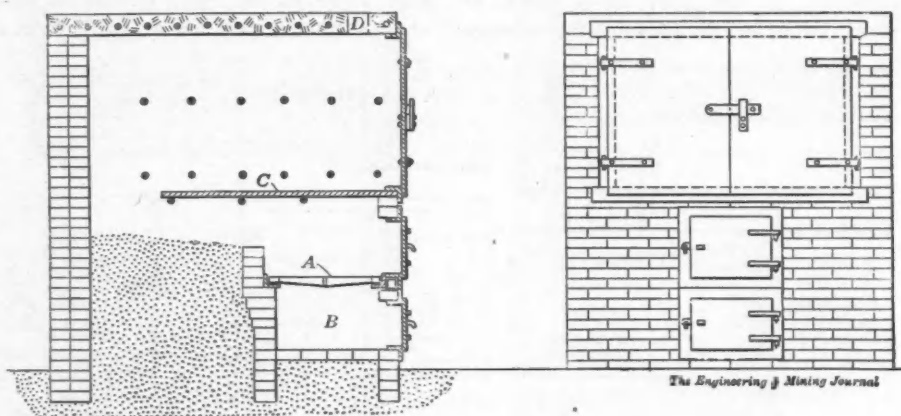


FIG. 19. DRYING OVEN FOR CORES

the sand freely it is sufficiently open to vent freely.

MATERIAL FOR DRY-SAND WORK

For dry-sand work a mixture of sharp sand, molding sand and some binder is generally used. The binders for this purpose may be flour, clay wash, glutrin or molasses. Glutrin is an adhesive compound made from the waste liquor from the sulphite-paper process and is used extensively in foundry work as a binder for dry-sand molds or cores. Its advantages are that it works well in mixtures containing clay and that it does not ferment or lose strength as does molasses. On account of its low cost and efficiency it is also much cheaper than other binders. It will also stand a higher baking temperature in the oven than flour, and does not give off as disagreeable odors when the mold is poured as does flour.

One of the oldest binders known to the foundry trade is rye or wheat flour. To render this the most efficient it should

flour, or in some cases molasses is substituted for glutrin. From one to two inches of this is placed next to the pattern and the rest of the mold filled with what is known as backing sand, which is the regular heap sand of the foundry wet with clay wash and glutrin.

Dry-sand molds are rammed much harder than green-sand molds, on account of the fact that they are afterward thoroughly dried and hence vent more freely than green-sand molds. For dry-sand molding, iron flasks are necessary as the molds must be baked at a temperature of not less than 250 or 300 deg. F. Dry-sand molds are usually given a coating of wet blacking before they are baked. In this case the blacking consists of coke dust or graphite mixed with clay wash and glutrin or clay wash and molasses. The glutrin or molasses is mixed with water in the ratio of about one part glutrin or molasses to four or five parts water and some clay wash is frequently added, though many molders now omit it entirely. Good castings can

increase its diameter near the plate and decrease its length. For this reason all cores should be measured after they are dried. If the cores made in round boxes like that shown in Fig. 15 are so long that they cannot be supported on one end it will be necessary to provide a sand support for the core while drying. This is accomplished as shown in Figs. 16 and 17. The core is rammed in the box by placing the box on end, introducing sand and ramming material into it, after which the box is laid on its side and one half removed. A small frame made of thin material, as shown at *A A*, is then dropped over the top of the core and ordinary sharp sand filled in around the core, as shown at *B B*. The sand used for supporting the core should be dampened so that it will not have a tendency to dry the core before it is baked. The core plate *C* is then placed on top of the frame and the whole rolled over. The half box *D* is then removed, after which the frame *A* is lifted off and the core left standing on the sand as shown in Fig. 17. After the core has been baked the sand which was used as a support and which contains no bond can be brushed away easily.

CORES OF IRREGULAR FORM

If cores of irregular form or cores having two or more diameters are required the boxes may be made as shown in Fig. 18. In this case the core is cylindrical but of two diameters. The large portion is formed in the part of the box extending from *A* to *B*, while the small portion is formed in the part of the box extending from *B* to *D*. Each half of the box is made of two pieces, there being a parting or division line at *B*. After the two parts are made they are secured together by strips *C C*, which are nailed to the sides of the box. In ramming the core the end *D* is placed on the bench, sand rammed into it, a core plate placed on the end *A*, and the box turned over into a vertical position resting on the plate. The box is then lightly rapped with the mallet and the two halves separated, leaving the core standing on the plate. Ordinary cores of this kind are strengthened by placing one or more rods or pieces of wire in the core while the sand is being rammed into the box. The core is also vented by forcing a vent wire down through it several times.

All core-sand mixtures should be thoroughly shoveled or worked over and sifted two or three times to insure uniform mixing. In emergency work there is frequently no other binder to be had except flour or possibly molasses. If a small foundry department is to be maintained regularly, a binding material should be kept on hand. Sometimes

ground rosin is used as a binder, and this has little green binding power. It develops its binding power as it melts and flows through the sand when the cores are being baked in the core oven. There are several black core compounds on the market which have some form of pitch as a base and these act very well indeed for heavy or chunky work.

CORE OVENS

For baking cores some form of a core oven must be provided. Fig. 19 shows one form of homemade core oven. A coke fire is maintained on the grate *A* and the ashes fall through into the ash-pit *B*. Over the fireplace there is an iron plate *C* which is supported on several bars as shown. The fire passes under this plate to the rear of the oven, rises and passes through the oven and out at an opening in the roof shown at *D*. This may be connected with the chimney or may be controlled with a small plate that slips over it and acts as a damper. In the construction shown, the back and side walls of the structure are of brick. The roof is of reinforced concrete and the front is of sheet iron. A pair of ordinary boiler fire-doors are placed in front of the fire box and ash-pit. Two rows of iron bars are laid into the side walls, extended across the furnace as shown in the cross-section. The core plates are placed on these. Preferably the temperature in the oven should not be allowed to rise above 450 deg. F. and the cores should be baked until all moisture is expelled and the surface of the core shows a slightly brown color.

Duty on Sulphur

WASHINGTON CORRESPONDENCE

The Treasury Department has practically decided to withdraw from the position it has taken with reference to the duty on sulphur imported into the United States. Some time ago it ordered the levying of duty on sulphur of a fineness approximating 100 per cent., on the ground that such sulphur was really refined sulphur and as such was subject to duty as against the unrefined sulphur which the tariff act of 1909 directed to be admitted free. The department has not issued any ruling thus far and has in fact allowed domestic producers of sulphur until Oct. 24, within which to prepare argument against the proposed new ruling. It is understood that the Nevada producers will present their case in person before that date, while many other interests have already submitted written argument. At present, however, the authorities have substantially made their minds up in the way indicated, although they are still willing to hear further debate on the subject.

The United States produced 255,534 long tons of sulphur in 1910, valued at

\$4,605,112, according to figures compiled by the U. S. Geological Survey. This is an increase of 16,222 tons in quantity and \$173,046 in value over the output for 1909. The sulphur industry in this country is substantially an American one, for the imports for 1910 were valued at only \$558,611, while the exports amounted to \$552,941. Four States—Louisiana, Nevada, Utah and Wyoming—produced practically all our sulphur. These imports, however, do not include the sulphur imported in pyrites.

Oil Engine for Driving Gravity Stamps

BY JAMES A. SEAGER*

The application of mechanical power to ore extraction has brought in its train a demand for a means of developing power which is available at any part of the world. The transport of wood or coal is oftentimes a serious matter, so that the utilization of crude petroleum residue, which is obtainable nearly everywhere, is an important development. The flash point of this crude oil is high, so that fire risks are minimized and the problem of storage is greatly simplified. The installation of a Willans-Diesel engine developing 200 b. h. p. for the purpose of driving stamps in one of the mines in Borneo, is therefore a matter of more than ordinary interest.

This engine, made by Willans & Robinson, Ltd., of Rugby, England, is of the reciprocating type, designed to utilize the Diesel principle of obtaining power from crude oil, residues, etc., without the disadvantage found in many other types of gas and oil engines. On the first downstroke the engine draws in air only; in the following upstroke the air is compressed. The second downstroke admits fuel, and combustion takes place, and the following upstroke is utilized to expel the products of combustion. There are thus differences between this mode of operation and the ordinary Otto cycle, the first being that in the latter an explosive mixture is drawn into the cylinder on the first downstroke. This is not the case in the second type, so that any risk of premature ignition is avoided. The combustion does not partake so much of the nature of an explosion but produces a more gradual expansion of the gases than is found in the ordinary form of oil engine. Moreover, in the ordinary forms of oil engine some form of hot tube, igniter or electric spark is required to fire the charge, while the oil in the Diesel engine is ignited solely by the temperature of the air present in the cylinder at the end of the compression stroke. The ease of operation and control and the extremely low running, maintenance

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and fuel costs of this system are proved by experience. The good-running qualities of the engine are due on the one hand to the absence of any explosion, regularity of control of fuel supply, uniformity of ignition and comparative absence of noise and vibration, which are inherent in the principle, and on the other hand to substantial design and excellence of material and workmanship.

EFFICIENCY OF DIESEL ENGINE

As is well known the thermal efficiency of the Diesel engine is in advance of that of any other type of prime mover, for whereas, the best type of modern steam engine has an efficiency of 15 to 20 per cent., the explosive type of oil engine 20 to 25 per cent., and the gas engine 25 to 30 per cent., from the Diesel oil engine a thermal efficiency of about 40 to 45 per cent. is secured. From this it follows that Diesel engines, even of small size, require but 0.45 lb. of fuel to produce one brake horse-power hour, while larger engines require but 0.41 lb. of fuel to produce one brake horse-power hour, and the consumption of fuel per brake horse-power remains practically constant throughout the entire range of load on the engine, the difference between full and half load in the case of small engines being 0.1 and for the larger engines 0.07 lb., while even at quarter load the corresponding figures are 0.3 and 0.25 respectively. It must be borne in mind that no fuel is expended excepting when the engine is actually running, and the fuel costs are the actual ones, and subject to no additions to cover the fuel consumed in the boilers and producers of steam or gas-producer plants. The cooling water required, entering the engine at say 60 deg. F. and leaving at 120 deg. F. is less than four gallons per hour per brake horse-power and may either be taken from the usual water supply or a cooling tower of small size may be used.

In order to appreciate the simplicity of this type of installation a diagrammatic sketch is given herewith. For the sake of simplicity a single-crank engine is shown, the pipework required for two or more cylinders being but an extension to each class of pipe, since each cylinder is operated in a similar manner. A main fuel reservoir *R* of sufficient capacity for 24 hours running is installed at a suitable height above the engine, so that the oil will flow by gravity to the fuel filter tank *FF*. This latter tank, in addition to forming an oil filter, also performs the duty of a float chamber by maintaining the oil at a constant level, and so at a constant head above the fuel pump *FP* on the engine; to which pump the oil flows by gravity. A reservoir *PT* is provided to hold a supply of ordinary paraffin oil for occasional cylinder-cleaning purposes.

For the storage of the fuel an old boiler shell may be used with advantage, which may be placed in any convenient position, the fuel from this storage tank being delivered to the main fuel reservoir *R* by means of a small hand pump and piping. An air compressor *C*, driven direct from the engine crankshaft, supplies air through pipe *DP*, at a pressure of about 1000 lb. per sq.in. to the injection-air reservoir *A1* and to the two starting-air reservoirs *A2* and *A3*. When the engine is first installed the air reservoirs *A1*, *A2* and *A3* are already charged so that the engine may be started up. During running the air for blowing the fuel into the cylinder is

acted by the engine crank shaft. The function of this pump is to force the fuel into the fuel valve *FV*, against the pressure therein, and only in such quantities as the actual load on the engine demands.

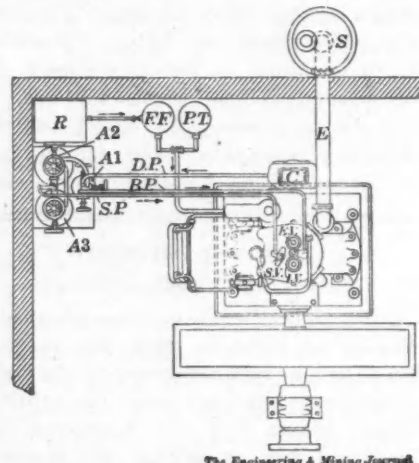
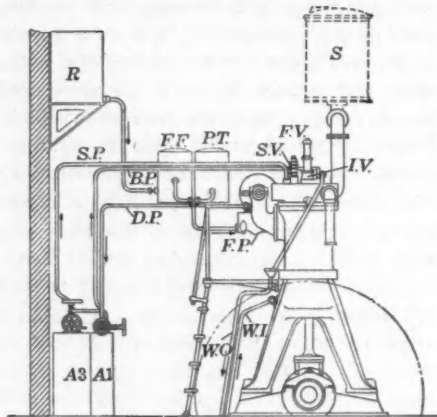
FLOW OF FUEL

In the fuel-valve chamber is placed a needle valve actuated by a lever driven from the engine camshaft, on the opening of which valve the fuel is blown violently past the pulverizer so that it enters the cylinder in the form of a fine mist. The air compressor *C*, thus blows the fuel into the engine cylinder, being connected to the air-injection reservoir *A1*, which in turn is connected to the fuel valve *FV* by suitable piping *BP*. The fuel enters the engine cylinder immediately after the completion of the compression stroke when the air contained therein is at a pressure of about 450 lb. per sq. in., which pressure is the maximum throughout the complete cycle of operations. At the temperature due to this pressure its combustion takes place, and the piston is driven downward, the products of combustion are released on the last upstroke of the cycle by means of mushroom valve *EV*, and air for combustion is admitted to the cylinder by means of a mushroom valve *IV*. Both these valves are actuated by the camshaft. The exhaust products are carried away to the atmosphere through a suitable silencer *S*, by the pipe *E*. The engine cylinders are jacketed for cooling by water, which may be supplied from any suitable source through *WI* and *WO*.

THE GOVERNOR

The governing of the engine is effected by means of a centrifugal governor which, acting upon the inlet valve of the fuel pump, regulates the fuel supply to the engine. The amount of fuel admitted to the cylinder thus depends on the load on the engine at the moment before the ignition, and so the strength of the impulse is exactly in accordance with the load, and this coupled with the fact that the intensity of ignition is the same at each stroke, gives extremely even running. The bearings of the main shaft are copiously lubricated by revolving rings dipping into oil wells. The crank pins are lubricated by gravity feed, while the pistons and piston rings are supplied by positive timed forced feed.

The engines are designed and rated to develop their full continuous horse-power at any altitude up to 500 ft. above sea level. For greater altitudes it is found that a deduction of about 5 per cent. for each 1000 ft. above sea level has to be made. With this provision there is no situation where the engine described cannot be operated on crude-oil fuel, so that it will be seen to be eminently adapted for mining work.



The Diesel Oil Engine

supplied by the air-compressor delivery through the injection-air reservoir. In the diagram *BP* indicates injection-air piping and *SP* starting-air piping. Starting is effected by air alone, a separate air or starting valve *SV* being fitted to one of the engine cylinders. The engine is first turned by hand to the starting position. The starting-valve lever is put into working position; the air supply from the reservoirs is turned on and the engine is immediately set in motion. The starting-valve lever is then thrown out of action, which brings the fuel valve *FV* into operation and the engine then runs until the fuel supply is cut off.

The fuel flows down from the tank *FF* to the fuel pump *FP*, which pump is driven direct by a vertical shaft actu-

The Principles of Mine Taxation

By Edmund B. Kirby*

Originally taxation was based upon the most simple and effective of principles. The ruling power, when it wanted money, hunted up individuals who had property and grabbed anything in sight. Since this naturally led to a concealment of assets, persuasive measures, such as the lash, nose pincers or hot irons, were frequently used to make the subject cough up.

Eventually, through long ages of experience, it came to be understood that if a man was taxed too hard he could not earn anything for the next visit, and it was "fair" to distribute the exactness. This general idea of fairness has always had to struggle with the natural desire of every man to shove it on to the other fellow and the ability of the stronger men to do so.

The result has been the present taxation system of civilized countries, a complex, incoherent mass with injustices and other evils which have long attracted the attention of those who are interested in the problem of better government. Only within recent times has effective work been done in the direction of a scientific basis for taxation, and while many men are now devoting their efforts to the improvement of the system, others are busy with the work of securing a better administration of present laws. While England has been going through a revolutionary struggle of two years' duration, in order to introduce the modern principle of taxation, and in various States of this country preparations are being made for it, other States, together with many towns and cities, are trying to make the old system work better, to cut out coarse taxation graft, to secure more justice in assessments, etc.

THE MICHIGAN APPRAISAL

Michigan, like other States, has the so called general-property tax, which is assessed against all property, both real and personal. This has been accompanied by all the well known evils peculiar to the system, and the State has responded to the general movement throughout the country by creating a special commission to study the best means of effecting tax reform. At the same time the State board of tax commissioners, which has general charge of assessments, was instructed to make a new appraisal of mining properties, and for expert assistance the board engaged the services of the well known mining engineer, J. R. Finlay. His report published in recent issues¹ of the JOURNAL, in addition to furnishing valuable data upon the costs of mining, life of mines, etc., illustrates some of the difficulties of the present taxation system. It,

A discussion of the inequalities of present methods of mine taxation. Suggestion made that a separate tax levy should be made on mineral land and improvements, and that the former should then be increased and the latter diminished until speculative holders either had to sell or operate.

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therefore, serves as a text with which to call attention to the direction which reform must take before the mining industry can receive any permanent benefit.

Mr. Finlay, with an explanation of his reasons, divides mining property into four classes: Profitable operating mines, unprofitable operating mines and unworked mineral lands of two classes, those upon which mineral has been discovered, or partly discovered, and those upon which there has so far been no discovery.

For a profitable mine he ascertains as nearly as possible the average future production, the cost of the product and its selling price, which give the probable future dividend. He then estimates, as well as he can, the probable number of years this dividend will continue, and by applying the usual rule for calculating the present worth of an annuity, he derives the present value of the business. He explains that the equipment is considered to have no value, except as it contributes to the whole value of the business thus calculated.

For an operating but nonprofitable mine he appraises the entire value as nothing. For unworked lands where discoveries have been made or are highly probable, he hopes later "to work out some scheme for valuing them on a rational basis." For undeveloped mineral lands, where discoveries have not yet been made, he says that "no definite appraisal can be made." He "can see no way to come to any conclusion about such lands other than to attempt such an analysis of the facts as may limit the range between which guesses will be reasonable."

¹ENG. AND MIN. JOURN., Sept. 9, Sept. 16, Sept. 23, Sept. 30 and Oct. 14, 1911.

Now Mr. Finlay has nothing to do with principles or methods of taxation. His work was a specified task, performed under the limitations of the law and the instructions of the officials who apply it. If, therefore, the logic of so able an engineer stumbles and halts and finally gives it up, it is because that logic has ventured into difficult and dangerous territory. As a matter of fact it is on the battlefield where the modern principle of taxing natural resources is everywhere contending with and overcoming the old idea of taxing everything within reach.

So, it is not intended to criticize Mr. Finlay's conscientious efforts or those of the public officials who are so evidently trying to improve matters. It is merely desired to offer certain suggestions about this problem of mine taxation, with which other States are also struggling.

METHODS OF APPRAISAL USED

The law specifies that taxation shall be by "a uniform rule" and that all property shall be assessed at its "true cash value," which the assessor is "to estimate according to his best information and judgment." If these directions could be carried out, the taxation would be considered fair, at least so far as the present system permits fairness.

Now, it has long been settled that "true cash value" has but one meaning in law, or business, or in general use, and that is the amount that a property would bring if sold under normal circumstances and by the methods usual for that class of property. This value is whatever the business world makes it. Value is desire expressed in cash, and whether the thing is desired for the purpose of eating it, or of deriving revenue from it, or of looking at it, or of gambling or swindling with it, does not affect the reality of its value. Value may or may not depend upon earnings or earning capacity.

Dwellings and their ground, automobiles, diamonds and vacant city lots do not produce revenue, but nevertheless have real value, subject to taxation. The aforesaid appraisal uses earnings as the sole measure of value for operating mines and neglects the fact that the actual value of a mine is due to various qualities, among which are generally found speculative possibilities and sometimes earnings. In the absence of earnings, the value created by speculative possibilities remains and is just as real as the other, but since these realities are disregarded, an adjoining mine with say \$2,000,000 worth of valuable mineral land and \$500,000 worth

of machinery and improvements, but which for one reason or another is operating at a loss, has "its true cash value" given as nothing. The same logic would make all the undeveloped mineral lands of Michigan also worth nothing, notwithstanding the obvious fact that a buyer would have to pay enormous sums for them.

NO JUSTICE IN TAXING DIVIDEND-EARNING POWER

To tax a successful mine because it can stand it and except non-profitable and also unworked property, because it cannot, is a rule which, if adopted, should be made uniform and applied to other kinds of business. Farms, city buildings, brick yards and factories should have their books and private affairs overhauled by officials and be taxed when making money, but allowed to go free when running behind. To get revenue out of those who can best afford it has always been a popular idea and has certain arguments in its behalf. It has, however, been tried in innumerable ways, but without much success and the principle is out of date. There is a more just and rational basis for Twentieth century taxation.

ASCERTAINING MINE VALUES

The fact is that there is nothing mysterious about mining property which affects the determination of its true cash value. Many other kinds of real estate also have uncertainties as to their possible earnings and productive life. The same principles of valuation apply to mines as in the case of city lots, farms, saw mills or quarries. To ascertain the market value of anything which is not bought and sold daily requires work and inquiry, together with expert knowledge, experience and judgment. Value is a market fact and not what someone thinks it ought to be. In truth, it is often irrational. A private individual has no trouble in ascertaining exactly what he will have to pay for mineral land in a given locality or on a certain formation, and why should the State have any? As he reaches the vicinity of some big mine where price quotations, options, sales and transfers are infrequent, the data collected become less accurate and he must be content with rougher approximations. For the great mines themselves, his position is like that of some appraiser before a large piece of improved and operating real estate which has not been transferred for years and is not for sale. His case is more difficult than usual, but still one which is solved every day by expert knowledge, a study of the property and a comparison with data from the neighborhood. In such cases earning power may be an important one of the various elements

to be considered. The conclusion reached will not be far from the truth and after being thrashed out anew each year, it will soon become as close as any business estimate can be. The most important means of securing accuracy and fairness in assessment is publicity, letting every man know what his neighbor pays. This will soon correct errors.

IMPROVING THE TAXATION SYSTEM

The scientific principle which is now forcing its way into the taxation systems of civilized countries is that the burden must be carried not by productive industry, as at present, but by natural resources. The effect of this upon mining would be to stimulate the active operations of exploration, discovery and production and to discourage the speculative holding of unused mineral land.

Like other States which are rich in mineral resources, Michigan has great areas of valuable mineral land which are held tightly and are idle, undeveloped and unpopulated. This is not for the good of the State. As with speculative holdings everywhere under the present system, the taxes upon these lands are exceedingly small in proportion to their real or market value. Speculative holders of land which is not earning anything are extremely sensitive to taxation and if this land is merely assessed properly, as directed by the present laws, the increase will cause many holders to bestir themselves and to utilize their properties in some way. If, as a further step, the modern principle is then applied and taxes made uncomfortably heavy, speculators will be under a steady pressure, which will soon force them either to develop their resources or to sell to others who will do so.

NO TAXES ON IMPROVEMENTS

Under the above principle the taxes now paid by operating mines would be greatly reduced. Taxes upon the machinery, equipment, improvements or production would cease and the only one left would be that upon the value of the land they occupy. This value would be ascertained by the same simple, practical methods as those which are now employed for determining the ground value of any real estate. This change would encourage discoveries and active operations. The State wants these and should not punish men by fines for building up industries, giving employment to labor and populating waste places. It does not want the speculative holding of unused mineral resources and should discourage this.

If any State wishes to improve its taxation methods and incidentally to stimulate mining, but is anxious to move in the right direction, step by step and feeling its way, the following plan

should be adopted: The assessing machinery should be so improved as to secure honest and fearless assessments. All mineral lands should be appraised at their "true cash value," which is simply what one would have to pay if he bought them. Improvements should be valued separately from the land, this being necessary in the careful appraisal of any real estate in order to permit an intelligent comparison of values. Then the new principle may be applied by gradually reducing the tax on improvements and increasing that upon the land. This is now being done successfully with real estate in various places. The change may be made gradually while watching the effect. Incidentally, the increase in revenue to the State will be a surprise to those who are not acquainted with the extent to which speculative holdings of mineral lands everywhere escape their fair share of taxation.

Consolidated Mining and Smelting Company

The annual meeting of the Consolidated Mining and Smelting Company was held on Oct. 12, 1911, at Toronto. The financial report for the year ended June 30, 1911, showed a decrease in production owing to the working out of the St. Eugene and the fire in the Slocan a year ago resulting in the closing of the Kaslo & Slocan railway. The gross value of the output was \$4,437,901, as compared with \$5,911,797 for the previous year, a decrease being shown in all the metals. The net profit was \$202,278, as compared with \$309,945. The amount expended on development was \$438,354 and \$193,342 was written off for depreciation. Expenditure for the purchase and development of new properties was \$217,613, which was provided for by the issue of new shares amounting to \$250,000. During the year the company acquired a controlling interest in the Sullivan mine, and since the fiscal year terminated completed arrangements with the liquidators of the Le Roi for the purchase of its Rossland properties.

Russian Gold Production

A recent official statement gives the quantity of gold delivered to the Imperial Mint in Russia in 1910 at 2540 poods, 3 pounds, 95 zolotniks and 79 doli. In addition there was refined at licensed private laboratories 1066 poods, 26 pounds, 23 zolotniks and 79 doli; making a total of 3606 poods, 30 pounds, 23 zolotniks and 77 doli of fine gold. This is equivalent to 1,898,596.5 oz. fine gold, or \$39,243,990. Making the customary allowance for gold not reported, this would put the total production of Russia at 2,088,456 oz., or \$43,168,389 in value last year.

Gold Placers in Bolivia

By Miltiades Armas*

Bolivia, in the space of 300 years, has produced about \$206,000,000 worth of gold. Most of it came from alluvial deposits, situated on the eastern slopes of the Andes.

The Tipuani region stands foremost among the auriferous regions, while the Kaka district promises to become one of the chief producers on the eastern slopes.

AURIFEROUS QUARTZ LODES

Bolivia has not been noted for quartz lodes of such magnitude as to constitute centers for exploitation on a big scale. Of course, there are some lodes, such as Yani, Pallaya, and Araca, but all these mines, which I have carefully examined, can be remunerative only if worked on a limited scale.

The region of the Andes, situated north of Illimani, is composed mainly of granitic masses, overlain by old, highly metamorphic sedimentary rocks, such as mica schists, gneiss and quartzites. Small

Several gold bars in the Rio Kaka, a tributary of the Amazon, are being developed by an English and an American company, with every prospect of success.

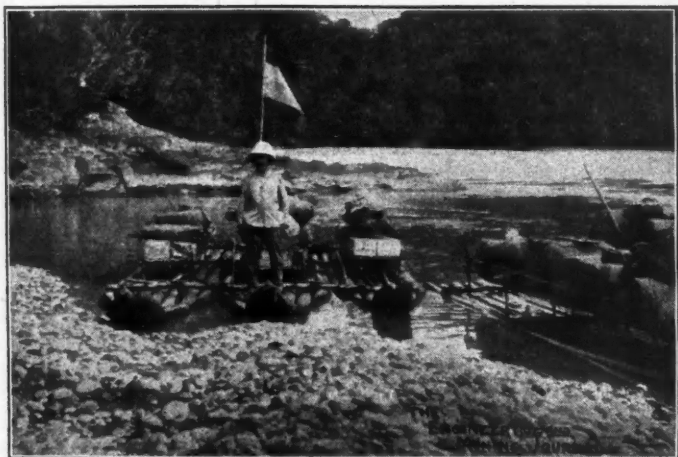
*Formerly general manager, La Paz Mining Company, La Paz, Bolivia.

able veins and veinlets bountifully supplied with gold, which form an almost inexhaustible source of gold for the placer mines, which lie at no great distance.

At the summit of the Andes, 21,000 ft., the variations of temperature are great and abrupt. This, combined with the action of ice and water, causes enormous

observe in La Paz and Chuquiaguillo, where we also see two or more false bedrocks, composed of hardened clay, due either to a period of calm accumulation of fine clay, corresponding to a partial withdrawal of the ice sheet, or to the simple fact that fine sediment was carried farther than the other detritus before coming to rest. It is often noticed that big boulders are lying over or near these false bedrocks; their presence there can be ascribed only to ice floating on the lake, for no matter what the potential energy of a stream might be, it could not move those enormous blocks, weighing often several hundred tons.

Near Yani at certain places the boulders are replaced by big, flat, angular rocks, mostly slate, which resist the carrying action of a stream. This fact was not taken in consideration by an Englishman, who some 15 years ago attempted to work these deposits by hydraulic methods. The nature of the boulders



THE MAPIRI RIVER, BOLIVIA



MAYAYA BAR, KAKA RIVER, BOLIVIA

veins and veinlets of auriferous quartz abound. Some of these are lenticular in shape, or show a general saddle-reef structure. In these saddle-reefs the gold occurs irregularly disseminated in coarse grains of fine grade.

Near Sorata, I know only two lodes which have been worked extensively, the Yani and the Pallaya. At this latter mine, the Spaniards appear to have carried on extensive works, if we can judge from the dumps and the ditch line hewn in the rock of the precipitous cliffs.

The Pallaya lode crosses the ridge of the mountain that separates the valleys of Yani and Pallaya. The lode contains arsenical pyrites, and a test on the dumps revealed the existence of free gold.

SOURCE OF ALLUVIAL DEPOSITS

If the Andes are deficient in regular and powerful lodes of auriferous quartz, they are, however, riddled with innumer-

able blocks of rock to be detached from the cliffs, and to be carried down by the glaciers in the shape of boulders. Furthermore, at those altitudes, the streams possess great potential energy, which is spent in moving these boulders to lower altitudes, forming morainic deposits. Hence, we find enormous boulders (deposited by ice) and big stones, subangular in shape, and gravel all jumbled together with no apparent regularity, until we reach the site of a former lake, such as the valleys of La Paz and Chuquiaguillo. On reaching the shores of a lake, big pieces of ice were evidently detached from the glacier and as these icebergs melted away, they would dump into the lake whatever boulders they might be carrying. Glacial streams, in the meantime, continued to bring gravel, sand, loam and clay, until the lake was filled. In these deposits we see a certain regularity of deposition, evenly bedded gravel, sand, etc. This kind of formation we

observed and their size did not permit successful washing with hydraulic giants; their accumulation was so rapid and their removal so expensive that soon the enterprise was abandoned.

CHUQUIAGUILLO PLACER MINE

The Chuquiaguillo placer mine is only 30 minutes' ride from La Paz. It was purchased by a German company, of Dresden, which at once adopted the hydraulic system for exploitation. Between the last false bedrock and the surface are several hundred feet of detrital accumulations, composed mostly of big boulders, with gravel and sand. The concentration of the gold is confined mostly, although not exclusively, near or next to the false bedrocks, or all around the big boulders, which may rest on the bedrock. The distribution of the gold is irregular and follows certain channels not well defined. The gold is rather coarse and rounded, nuggets weighing several

pounds being found. The gold is not of fine grade, for it contains 25 per cent. silver.

Although it is asserted that the gravel averages 60c. (U. S. currency) per cubic yard, I think that the average has not been determined in a satisfactory manner. Exploitation by hydraulic mining did not prove a success; the rapid accumulation of big boulders requiring blasting and shifting before the balance of the gravel could be diverted to the sluices. The quantity of water, also, was not sufficient to handle such an enormous amount of dirt.

The Indians worked these deposits by drifting, which was followed up to the time the German company bought the property. Tools and even skeletons of miners of the Incas are found in old drifts which caved in and buried the unfortunate miners. It shows plainly the system they had adopted by following the rich pay streak all along the false bed rocks and around the boulders. It is a question if even today drift mining, with sluicing, would not pay better. It is also a question whether placer mines too near the glaciers, or at the side of abrupt mountains will pay, however rich they may be. For it must not be lost sight of that big boulders, or even smaller ones, if angular and flat (as at Yani), are so difficult to handle that a water current can hardly dislodge them.

THE RIO KAKA

From Yani, a four days' ride on a trail which at places is steep and precipitous, brings one to Mapiri. From here to the Kaka placer mines the trip is made on rafts, through shallows, rapids and gorges, where the stream is dangerously swift. The river Mapiri receives many other streams of equal or bigger volume than itself, especially the rivers Tipuani, Challana and Coroico. All these streams are torrential, and coming from the glaciers of the Andes, cross rich alluvial deposits.

The river Mapiri, not far from the village Guanay, at its confluence with the Coroico, changes its name to Rio Kaka. It is a torrential stream. Rapids, whirlpools, shallows and swift currents in gulches are frequent down to Retama, 27 km. below Guanay, but from the Retama rapids downward the river finds, to a certain extent, its equilibrium profile. The consequence is that, while one observes big boulders down to the Retama rapids, below this point there is a marked absence of big boulders and a more even flow, while red sandstones replace the slate formation. The vegetation is luxuriant. The trip lasts two or three days, finally reaching the Rio Kaka placers.

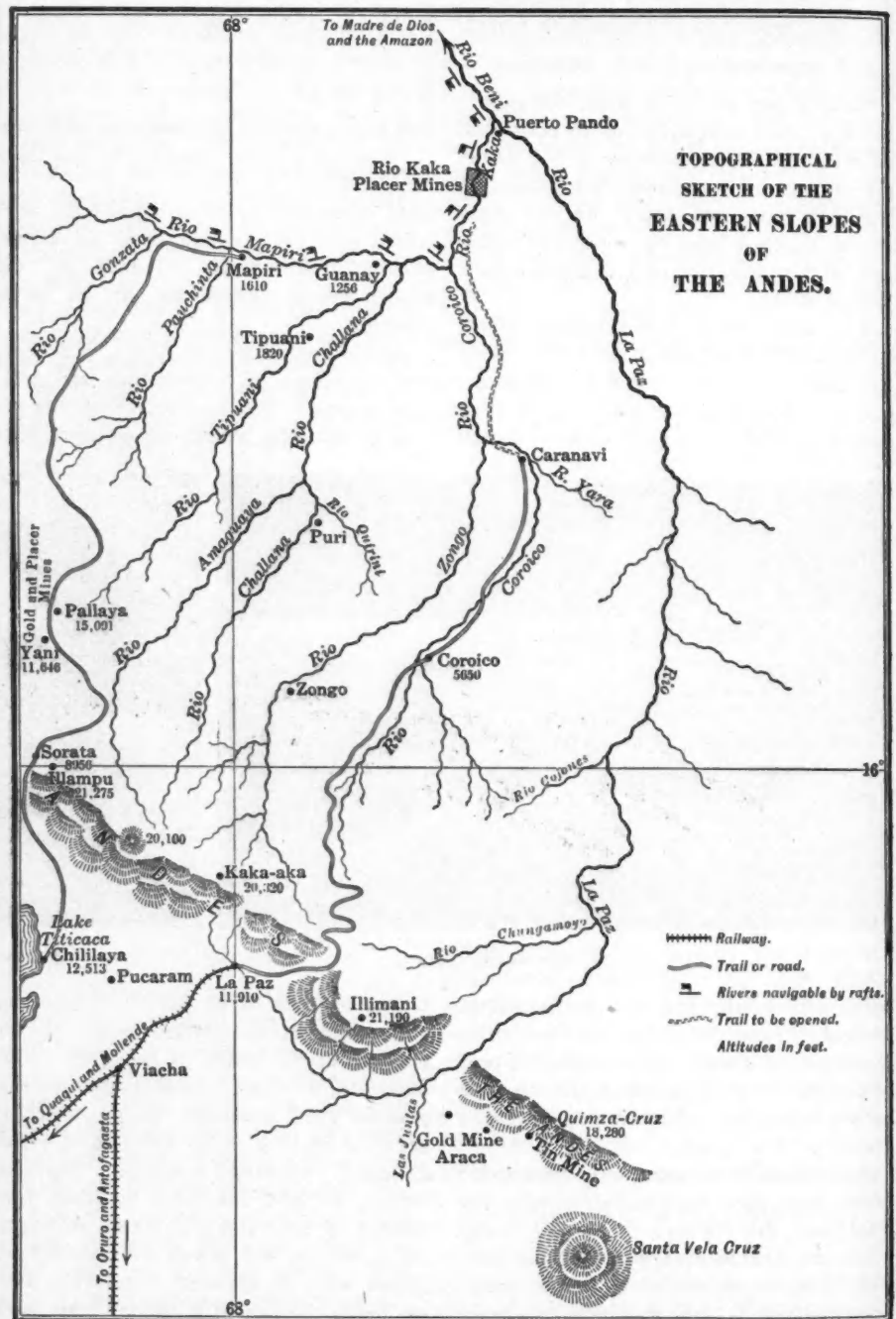
At Incahuara, just before reaching the placers, the river runs between two bluffs, formed of red sandstone and con-

glomerate; two miles farther down, the ranges of hills suddenly diverge and form a big valley of elliptical form, with a major axis of about 5 km. and a minor axis of about 3 km. The Mayaya, the Thalia, the Maquique and the Lady bars, which constitute the placers of the Rio Kaka, are within this area and half of them belong to an English corporation, The Incahuara Gold Dredging Company,

and from two to 20 ft. deep, with an average depth of six feet.

THE BED ROCK

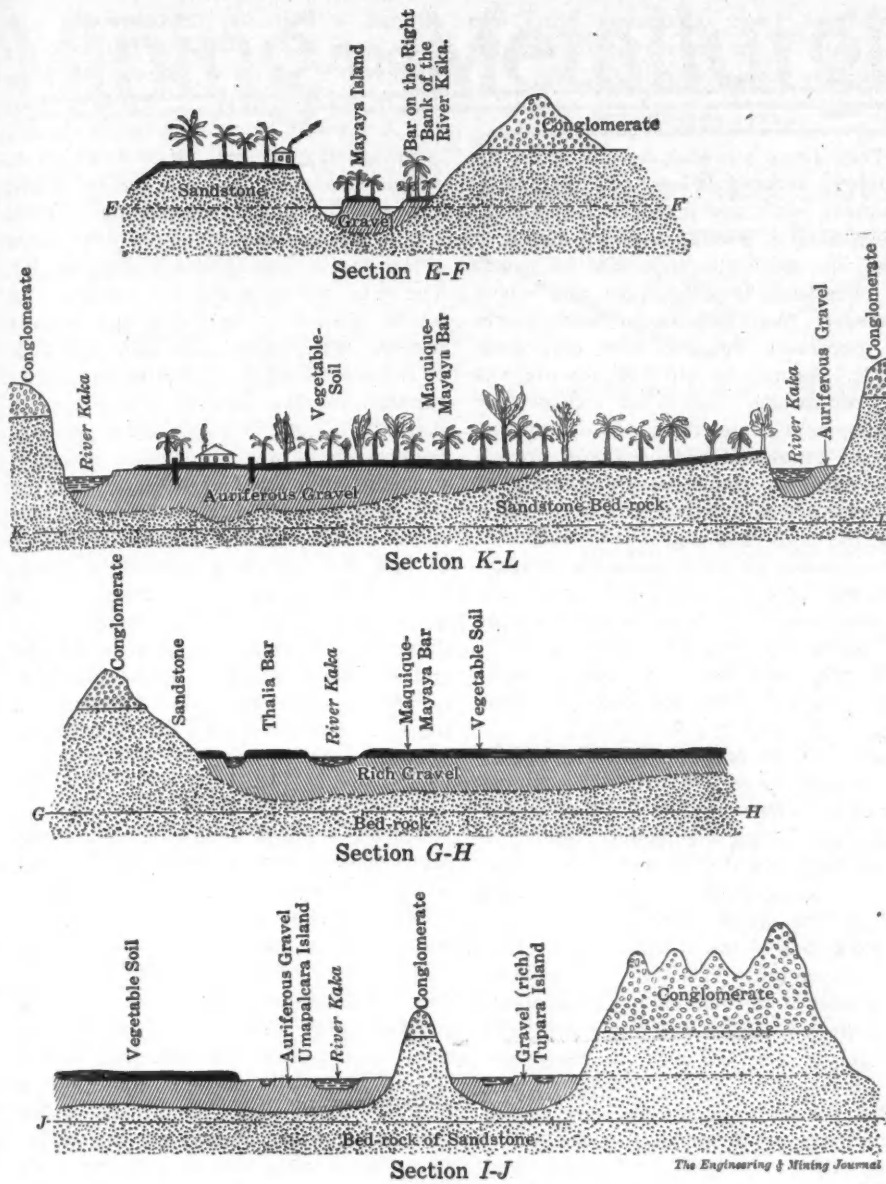
The alluvial deposits lie on a red sandstone bottom. At Mayaya, the red sandstone, where in contact with the overlying conglomerates, is decomposed *in situ*, and can be easily scraped. Such, most probably, is the case also at its con-



TOPOGRAPHICAL SKETCH OF THE EASTERN SLOPES OF THE ANDES.

Ltd. Near the Lady bar, the two ranges of hills approach each other again and form a short gulch, the Umapalcara. From there on the valley becomes alternately narrow and wide; some important alluvial deposits are found below here, belonging to an American company, the Kaka Mines Company. The Maquique and the Thalia are the most important. The Rio Kaka is between 400 and 500 ft. wide,

tact with the auriferous gravel, and the dredge buckets will easily scrape the bottom and save most of the gold values on the bedrock. Although the test shafts, sunk in various places, did not reach the bedrock owing to inrush of water, judging from the configuration of the place I do not believe the bedrock is more than 25 to 30 ft. below the surface.



COMPOSITION OF THE GRAVEL

The gravel of the bars is composed of small rounded pebbles and sand containing a great deal of mica, with abundance of black sand and garnet. Boulders are practically absent; the biggest encountered was not larger than 24x12x10 in., say 1.68 cu. ft. The gravel does not contain clay. The Maquique-Mayaya bar has vegetable soil, sandy clay, and sand as the greater part of the overburden. The thickness of the overburden varies from 6 to 10 ft., but, as a rule, near the bank these accumulations above the gravel do not exceed 6 to 7 ft. The vegetable soil and the sandy clay contain no gold; the sands which lie on the gravel are also barren, except in some places when only traces of gold are found. The gravel shows gold from the top, which shows a tendency to increase with depth.

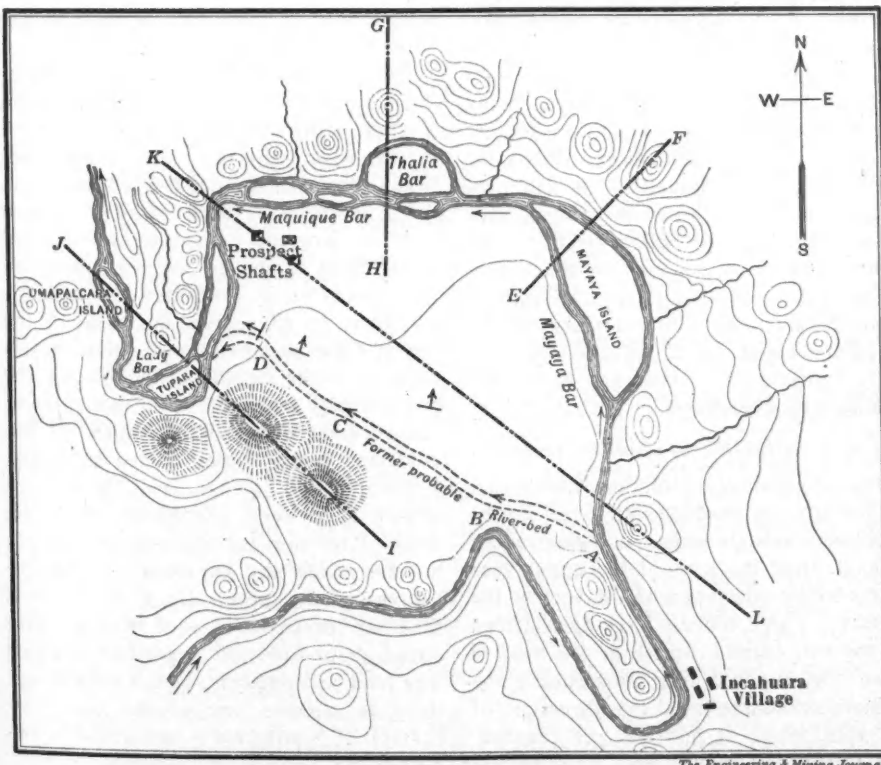
The gold is uniformly flaky and sometimes lenticular in shape, but sinks well. I do not think there will be any difficulty in saving it, particularly with the modern improved tables. The grade of the gold is high.

LOG ACCUMULATIONS

Floods and freshets cause the level of the river to vary considerably, within a short time, and enormous quantities of wood and logs are carried down. When the river is high the current becomes swift enough to carry them beyond the precincts of the placer, and way down to Ruremabaque. Notwithstanding this, in the whirlpools, heavy logs are sunk, and accumulations of this nature take place. Fortunately, they are found only in determined places. The accumulations encountered while sinking the test shafts presented decayed trunks of trees, which a dredge would have no difficulty in raising. The biggest accumulations covered an area of 30x200 ft. The gravel all around them is exceptionally rich.

GOLD TENOR OF THE GRAVEL

As the bedrock has not been reached, I can state only the average tenor of the gravel through which the shafts and pits were sunk. The various claims were divided into squares; at the center of each square, a shaft was sunk and a pit at each alternate corner. The examination of the ground was carried on as systematically as possible. The tests were made on one or two cubic yards from each shaft or pit, with a California rocker. The results showed as a maximum \$0.78 per cubic yard, and as a minimum \$0.33. Some pits, particularly those close to the river, gave higher results. For instance, at the Maquique bar I obtained \$1.00, at the Thalia bar, \$1.75. The Mayaya bar is poor, but Mayaya island is rich. The Lady bar is also rich.



Every cubic yard washed gave an abnormal quantity of black sand. In the pan, while separating the gold from the black sand, a streak of gray sand would invariably adhere with the gold, and it was difficult to get rid of. This grey sand, of high specific gravity, was not tested for rare elements, such as iridium, etc., which it may contain.

EXPLOITATION

From the foregoing description, it is clear that the placer is a dredging operation; with that in view, the Incahuara Gold Dredging Company, Ltd., has been formed under the management of John Taylor & Sons, of London. The company, at considerable expense, has brought in a dredge, built by Lobnitz & Co., of Renfrew, Scotland. Its erection is nearly complete and dredging will soon begin.

During the rainy season, when the floods of the Rio Kaka are frequent, the dredge will be able to operate inland on the Maquique bar. As the burden over the gravel does not exceed 10 ft., and the bedrock does not seem to be deep, the prospects of success are encouraging, and the area to be profitably dredged in the company's claim is quite extensive.

The Helester Mines of California

BY WILLIAM H. STORMS*

The mines of the Helester Gold Mining Company are situated in the cañon of the American river, in Placer county, California, about the center of what is designated the Colfax quadrangle by the U. S. Geological Survey. This quadrangle of the geologic atlas covers an area about 30 miles wide and 35 miles long, and has been one of the most prolific gold-producing areas of equal size in the world, having produced over \$200,000,000. The geology of this region consists principally of the paleozoic rocks of the Calaveras formation, with an occasional appearance of the Mariposa slates (Jurassic). These metamorphic rocks are intruded by dikes and masses of granite, rhyolite, diorite, diabase, gabbro, serpentine and more rarely andesite. The gold-bearing veins are confined to no particular kind of rock, but occur principally in the slate and granite areas, some of them being at or near the contacts of these rocks.

The most important mine of the Helester group is the Rawhide, which was said to have been discovered by Mexicans in early days, but who, owing to its then almost inaccessible position, were unable to accomplish much other than to drag some of the richest ore in rawhide sacks down to the river where it was ground in

arrastras. Later, Americans came into possession of the property, and began the systematic development of the vein.

EARLY DIFFICULTIES

They drove a tunnel directly in on the outcrop; secured a second-hand aerial tramway outfit and placed it in position; brought in a 3-stamp mill by sliding it down the steep mountain side by means of ropes snubbed about trees, and, where necessary, hauling the same heavy pieces of machinery up hill with block-and-tackle. As may be inferred, the ore was of good grade. They did considerable development, but their aerial tramway was an antiquated and unsatisfactory affair, likely to dump the ore midway of the mine and mill, which it frequently did, and the mill was light and inefficient. After several years of constant struggle with the adverse conditions imposed by the situation, deep down in the cañon of the North Fork of the American river, these men sold out to a stronger company, which continued the development.

Still later the property was acquired by the present owner, the Helester Mining Company, which has built a fine wagon road from Gorge, the nearest station on the Southern Pacific railroad, to the mine, 1600 ft. below in the cañon. This road was cut the greater part of the way in the solid rock of the mountain side. It is nearly three miles in length. A 10-stamp mill replaced the old one; a compressor was installed, a ditch and flume were built to supply power, and with this equipment the development of the property proceeded, the ore extracted not only paying all expenses but dividends as well.

Recently a substantial, well constructed three-rail gravity tramway was built from the level of what is known as tunnel No. 3 to the mill, on which the loaded descending car will haul up the empty. Large and commodious buildings are being erected for the accommodation of the men and for company offices. Plans for a new ditch and flume, which will provide about 500 h.p. when completed, have been made, and it is believed this will be sufficient power to drive all the machinery the property will ever require. The next thing the company will undertake will be the construction of a mill of 250 tons daily capacity, the plans for which are now under consideration.

MINING BY ADITS

The topographical situation is such that for many years the Helester mines can be operated through adits, it being about 1900 ft. from the level of the upper floor of the mill to the apex of the vein at the surface. Three tunnels have been driven on the vein, and a fourth at the mill is in several hundred feet, crosscutting the formation obliquely in the direction of the vein which it has not yet reached. The uppermost tunnel, No. 1, is in 500

ft. and is over 400 ft. below the surface at its face; No. 2 is 110 ft. lower than No. 1, and is in 780 ft.; No. 3 is 186 ft. lower than No. 2, and is in 1500 ft. A winze is being sunk below the No. 3 tunnel in good ore. It is down 36 ft. All of this work, besides the numerous raises and winzes between the various levels already opened, is in ore except a few feet at the approach of each adit. The vein, which is but 5 or 10 ft. wide where opened at the north end, widens rapidly going south, and near the face of the most southerly development, after running continuously in ore for more than 500 ft. longitudinally along the vein, the orebody is over 140 ft. wide by measurement, with good ore still in sight on the hanging-wall side, and across the southern face, with no definite knowledge of how far this great mass of ore does extend. Estimates of the amount of ore now available between the surface and tunnel No. 3 place it at between 300,000 and 400,000 tons, which seems sufficiently conservative, and will probably be found to greatly exceed the figure mentioned.

VEINS DIP STEEPLY

The ore deposits of the Helester mines occur in the dense grayish-black slates of the Calaveras formation, accompanied by dikes of intrusive rock of gray color and uniformly fine texture. The hanging wall strikes N-S, dipping 70 deg. east. The oreshoots stand steeply, pitching about 80 deg. along the plane of the vein. Going southward the vein splits, the hanging-wall portion following a band of black clay-slate which is but little mineralized, containing only a little pyrite, in this respect differing from the slates of the foot-wall side. The foot wall follows a large dike, which diverges from the hanging.

Between the slate band on the hanging side and the dike on the foot occurs a great stockwork of quartz veins and seams, which fills the entire country between the walls, being exposed as stated, for a width of 140 ft. at the southern end of present development. Several small dikes penetrate the ore zone, and these seem to have affected the mineralization to its advantage, the value of the ore and the percentage of sulphides increasing in the vicinity of the dikes. The ore is easily amenable to ordinary methods of treatment—amalgamation of the gold, and concentration of the sulphides.

The ground stands well and large stopes have been started in the main mass of the ore, but these seem scarcely to have made any impression on the resources of the mine. Up to the present time the property is said to have produced about \$180,000, a portion of which was paid in dividends, and it seems destined to become one of the most important of California's newer gold producers.

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Mining and Metallurgical Patents

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

COPPER

CONCENTRATION—Improvements in or Relating to the Concentration of Copper Ores. Henry H. Greenway, Melbourne, Australia. (Brit. No. 18,943 of 1910.)

COPPER-ZINC ORES—Process for the Treatment of Sulphureted Copper-Zinc Ores in a Converter. Désiré Korda, Paris, France, assignor to Société Commerciale des Mines, Minerals et Metaux, Paris, France. (U. S. No. 1,003,051; Sept. 12, 1911.)

GOLD AND SILVER

AMALGAMATOR. Clyde McKellar, Chicago, Ill. (U. S. No. 1,003,118; Sept. 12, 1911.)

CYANIDING—Method of Treating Ores. James Edward Porter, Syracuse, N. Y., assignor to the Just Mining and Extraction Company, Rochester, N. Y. (U. S. No. 1,002,446; Sept. 5, 1911.)

CYANIDING—Pressure Filter. Ernest J. Sweetland, Los Angeles, Cal. (U. S. No. 996,537; June 27, 1911.)

CYANIDING—Process of Treating Refractory Sulphide Ores. James Edward Porter, Syracuse, N. Y., assignor to the Just Mining and Extraction Company, Syracuse, N. Y. (U. S. No. 1,002,447; Sept. 5, 1911.)

ORE TREATMENT—Improvements in Processes for Separating Precious Metals from Ores. J. S. Island, Toronto, Canada. (Brit. No. 17,010 of 1911.)

PLACER-MINING APPARATUS. Edwin A. Newman, Washington, D. C. (U. S. No. 1,002,602; Sept. 5, 1911.)

REFINING—Process for Refining Silver Bullion. Balmer Nelly, Bradford, Ontario, Canada. (U. S. No. 1,004,676; Oct. 3, 1911.)

STAMP MILLS—Improvements in and Relating to Stamp Mills. Peter N. Nissen and Head Wrightson & Co., Ltd., Thornaby-on-Tees, Eng. (Brit. No. 26,745 of 1910.)

TUBE MILL—Apparatus for Dressing the Ores Containing Gold and Silver. Carl Glessecke, Brunswick, Germany. (U. S. No. 1,003,595; Sept. 19, 1911.)

TUBE-MILL LINER. George Hans Kirsch, Germiston, Transvaal. (U. S. No. 1,002,406; Sept. 5, 1911.)

IRON AND STEEL

BLAST-FURNACE PRACTICE—An Improved Method of Supplying Air to Compressors for Blast Furnaces, Converters and the Like. Jegor Bronn and Rombacher Hüttenwerke, Rombach, Germany. (Brit. No. 20,509 of 1910.)

BLAST-FURNACE PRACTICE—Improved Means for Utilizing the Waste Heat from Blast Furnaces, Smelting Furnaces and the Like. A. Saufer, Pittsburg, Penn. (Brit. No. 6296 of 1911.)

BLAST-FURNACE SLAG—Process and Apparatus for Puffing Blast-Furnace Slag. Heinrich Ottmann, Munich, Germany. (U. S. No. 1,003,406; Sept. 12, 1911.)

BLAST FURNACES—Improvements in or Relating to Blast Furnaces. John Dunham-Massey, London, Eng. (Brit. No. 19,620 of 1910.)

DRYING AIR—Method of Drying Air. Irving H. Reynolds and Fred E. Norton, Youngstown, Ohio. (U. S. No. 1,004,468; Sept. 26, 1911.)

DRYING AIR—Method of Drying Air. James Gayley, New York, N. Y. (U. S. Nos. 1,002,577 and 1,002,578; Sept. 5, 1911.)

ELECTRIC SMELTING—Improvements in Apparatus for the Electrical Production of Steel. F. Levoz, Heer, Belgium. (Brit. No. 20,594 of 1910.)

GAS PURIFIER. James P. Dovel, North Birmingham, Ala. (U. S. No. 1,001,738; Aug. 29, 1911.)

GAS WASHER. N. Latta, Assignor to Allis-Chalmers Company, Milwaukee, Wis. (U. S. No. 1,002,810; Sept. 5, 1911.)

HEMATITE—Process of Reducing Hematite to Magnetic Iron Oxide. Sten Lilja, Bayonne, N. J., assignor of one-third to J. W. Hugo Hamilton, St. George, Staten Island,

A Classified List of New Inventions



N. Y., and one-third to Nils V. Hansell, Caldwell, N. J. (U. S. No. 1,001,536; Aug. 22, 1911.)

LEAD, ZINC AND OTHER METALS

ALUMINUM ALLOYS—Improvements in Process of Making Aluminum Alloys. J. G. and W. F. Mellen, Mount Vernon, N. Y. (Brit. No. 3361 of 1911.)

LEAD—Process of Refining and Desilverizing Lead. George P. Hulst, Omaha, Neb. (U. S. No. 1,001,525; Aug. 22, 1911.)

NICKEL—Method of Electrolyzing Nickel Sulphate Solutions. Herbert H. Dow, Midland, Mich., and Walter S. Gates and Arthur E. Schaefer, Worthington, Ont., Canada, assignors to Ontario Nickel Company, Limited, Worthington, Canada. (U. S. No. 1,003,092; Sept. 12, 1911.)

TIN—Process of Detinning Tin Scrap. Karl Goldschmidt and Josef Weber, Essen-on-the-Ruhr, Germany. (U. S. No. 1,005,002; Oct. 3, 1911.)

TITANIUM ALLOY—Article Composed of Titanium and Nickel Alloy Together and Method of Producing the Same. Auguste J. Rossi, Niagara Falls, N. Y., assignor to Titanium Alloy Manufacturing Company, New York, N. Y. (U. S. No. 1,003,806; Sept. 19, 1911.)

ZINC—Process for the Treatment of Sulphureted Copper-Zinc Ores in a Converter. D. Korda, Paris, France. (U. S. No. 1,003,051; Sept. 12, 1911.)

ZINC—Production of Zinc Oxide from Zinc Ores and Zinc Residues. Woldemar Hommel, London, England, assignor to Metals Extraction Corporation, Limited, London, England. (U. S. No. 1,002,401; Sept. 5, 1911.)

ZINC—Rotary Metallurgical Furnace for Roasting Zinc Ores and the Like. Paul Schmedler, Lipine, Germany. (U. S. No. 1,004,916; Oct. 3, 1911.)

MINING—GENERAL

BORE-HOLE SURVEYING—Instrument for Surveying Bore Holes. George J. Maas, Negaunee, Mich. (U. S. No. 1,003,624; Sept. 19, 1911.)

DRILL—Rock-Drill Making and Sharpening Machine. Martin McHale, Phoenix, B. C. (U. S. No. 1,001,545; Aug. 22, 1911.)

DRILLS—Improvements in Pneumatically Actuated Percussive Boring Machines. Edward Altenhoff, Oberhausen, Germany. (Brit. No. 1641 of 1911.)

EXCAVATING DIPPER. Walter S. McKee, Glencoe, Ill., and Percival M. Villas, Minneapolis, Minn., assignors to Edgar Allen American Manganese Steel Company, Augusta, Me. (U. S. No. 1,001,289; Aug. 22, 1911.)

HOISTING—Improvements in Hoisting Apparatus for Mine Shafts. George Schwidtl Altwasser, Germany. (Brit. No. 1564 of 1911.)

LAMPS—Miners' Head Lamps. Martin J. Curtis, Billings, Mont. (Brit. No. 2485 of 1911.)

MINE CAR and the Like. William B. Lloyd, Yankee, N. M. (U. S. No. 1,003,477; Sept. 19, 1911.)

MINE-CAR STOP. George W. Jenkins and Edward Lowry, Nelsonville, Ohio. (U. S. No. 1,004,652; Oct. 3, 1911.)

MINE DOORS—Improvements in and Relating to Mine Doors. Newton K. Bowman, North Lawrence, Ohio. (Brit. No. 10,004 of 1911.)

SHAFT LINING—Lining Shafts with Concrete. Emil Lardy, Münster, Westphalia, Germany. (U. S. No. 1,003,140; Sept. 12, 1911.)

SHAFT SINKING—Method of Sinking Shafts in Loose and Watery Strata. Emil Lardy, Münster, Westphalia, Germany. (U. S. No. 1,003,141; Sept. 12, 1911.)

SIGNALING SYSTEM for Mines. Edgar M. Johnson, Hancock, Mich., assignor of one-half to Ross D. Blackburn, Hancock, Mich. (U. S. No. 1,004,879; Oct. 3, 1911.)

SKIP LOADING—Means for Loading Skips or Other Vehicles in Mine Shafts and the Like. John Whitford and Joseph Amos Mills, Johannesburg, Transvaal. (U. S. No. 1,001,106; Aug. 22, 1911.)

STEAM SHOVELS—Track Layer for Steam Shovels. Julius Smith and Frank N. Lovejoy, Macedon, N. Y. (U. S. No. 1,001,317; Aug. 22, 1911.)

TUNNELS—Means for Building and Reinforcing the Walls of Tunnels, Shafts and the Like. Thomas Malcolm McAlpine, London, England. (U. S. No. 1,004,288; Sept. 26, 1911.)

ORE DRESSING—GENERAL

CLASSIFIER—Sand and Slime Separator. Samuel J. Tennial, Wallace, Ida. (U. S. No. 1,004,105; Sept. 26, 1911.)

CONCENTRATING—Ore-Concentrating Machine. Orrin H. King, Chicago, Ill., assignor to United States Concentrating Company. (U. S. No. 1,002,525; Sept. 5, 1911.)

CONCENTRATOR. William P. Ogden, Denver, Colo. (U. S. No. 1,004,187; Sept. 26, 1911.)

CONCENTRATORS—Improvements in or Relating to Concentrators for Treating Ores and Other Material. E. F. Cassel, Paris, France. (Brit. No. 24,819 of 1910.)

CRUSHING MACHINE. Edgar B. Symons, Milwaukee, Wis., assignor to Smith & Post Company, Milwaukee, Wis. (U. S. No. 1,005,358; Oct. 10, 1911.)

MAGNETIC SEPARATION—Improvements Relating to the Separation by Magnetic Influence of Zinc, Copper and Other Sulphide Ores. W. M. Martin, Redruth, Eng. (Brit. No. 19,449 of 1910.)

ORE TREATMENT—Improvements in the Treatment of Ores. C. E. Baker, Chicago, Ill. (Brit. No. 18,452 of 1910.)

SEPARATION—Apparatus for Separating Ores. Thomas Charlton, Chicago, Ill. (U. S. No. 1,003,704; Sept. 19, 1911.)

WASTE ROCK—Apparatus for Disposal of Waste Rock from Concentrating Mills and the Like. Henry R. Wahl, Elvins, Mo. (U. S. No. 1,003,704; Sept. 19, 1911.)

METALLURGY—GENERAL

ELECTRIC FURNACE. Ernesto Stassano, Turin, Italy. (Brit. No. 8901 of 1911.)

ELECTRIC FURNACES—Electrode for Electric Furnaces. William Taylor Gibbs, Buckingham, and Robert A. Witherspoon, Shawinigan Falls, Quebec, Canada, assignor to the Shawinigan Carbide Company, Limited, Montreal, Canada. (U. S. No. 1,003,354; Sept. 12, 1911.)

ELECTRIC FURNACES—Improvements in Revolving Electrical Furnaces. O. Serpek, Paris, France. (Brit. No. 29,175 of 1910.)

ELECTRIC FURNACES—Method of Charging Electric Furnaces. Alfred L. Robinson, Niagara Falls, N. Y., assignor to International Acheson Graphite Company, Niagara Falls, N. Y. (U. S. No. 1,004,469; Sept. 26, 1911.)

ELECTRIC FURNACES—Method of Utilizing the Gases Resulting from Reduction Operations Carried Out in Electric Furnaces, and Electric Furnaces for Carrying Out the Same. Alois Helfenstein, Vienna, Austria-Hungary. (U. S. No. 1,002,988; Sept. 12, 1911.)

ELECTRIC RESISTANCE FURNACE. Albert Petersson, Odda, Norway. (U. S. No. 1,002,444; Sept. 5, 1911.)

ELECTRIC SMELTING—Method of Electric Production of Iron and Steel and Other Metals. Axel Rudolf Lindblad, Ludvika, Sweden. (U. S. No. 1,002,286; Sept. 5, 1911.)

EXTRACTION—An Improved Method of Extracting Metals from Their Ores and Apparatus Therefor. Universal Ore Reduction Company, Phoenix, Ariz. (Brit. No. 25,589 of 1910.)

GAS PRODUCERS—Improved Means Adapted for Use in Charging Gas Producers and Other Furnaces. H. Bittmann, Frankfurt-on-Main, Germany. (Brit. No. 9759 of 1911.)

HEARTH FLOOR—A New Hearth Floor for Calcining or Agglomerating Furnaces. Augustus Hagenmiller, Tarica, South America. (Brit. No. 17,420 of 1910.)

LADLE CAR—Hot Metal Car. William W. McKelvey, Youngstown, Ohio, assignor to William B. Pollock Company, Youngstown, Ohio. (U. S. No. 1,004,548; Sept. 26, 1911.)

i PERSONAL i

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

Frank B. Van Horn will, for the present, continue to act as chief geologist of the U. S. Geological Survey.

Francis Aspinall has been appointed inspector of mines for the Crow's Nest Pass district, Alberta, Canada.

T. W. Gibson, deputy minister of mines for Ontario, has returned to Toronto from a trip to Porcupine.

A. Goerz & Co., Ltd., of London and Johannesburg, have established a branch office at 1 a de Nuevo Mexico, 6, City of Mexico.

W. W. Leach, of the Geological Survey of Canada, has been investigating the geology of the Blairmore-Frank district, Alberta.

Walter Harvey Weed has returned from Newfoundland, where he has been making an examination. He expects to leave for Butte, Mont., early in November.

H. Peplow Pearse, of the Birch Creek Hydraulic Mines, Atlin, B. C., will be absent from the mines for about three months, looking over Pacific Coast properties.

Selwyn G. Blaylock, of Trail, B. C., assistant general manager of the Consolidated Mining and Smelting Company of Canada, Ltd., was at Spokane, Wash., recently.

Frederick H. Minard, of New York, is making a comprehensive examination of the property of the Arizona United Mining Company, in Johnson district, Cochise county, Arizona.

Spencer C. Rumsey, recently engineer of construction for the Oliver Iron Mining Company, has been appointed chief mechanical engineer of the company, in place of Henry J. Wessinger, resigned.

John T. Rew, of Lovelock, Nev., has been making an examination of lands in the Central Pacific railroad grant on behalf of the Government, in some contest cases pending in the Federal courts.

Charles Fergie, of Montreal, was in the Lethbridge and Pincher Creek districts of Alberta, about the middle of October, visiting several coal mines, the development of which is under his direction.

Kirby Thomas, of New York, and Warren F. Blecker, of Boulder, Colo., have concluded an extensive investigation of the Utah-Colorado vanadium and uranium deposits for interests represented by the W. H. Lorimer Sons Company, of Philadelphia.

The firm of Ropes & McIntire, consulting and mining engineers, Helena, Mont., having been dissolved, Mr. Ropes will continue in his profession in Helena with offices at the Court House. It is Mr. Mc-

Intire's intention to engage in engineering in southern countries.

William F. Kett has been appointed by the Mountain Copper Company, Ltd., general manager of its business in California, with headquarters in San Francisco. Mr. Kett has been assistant general manager for the past six years and now, succeeds Lewis T. Wright, recently resigned.

E. R. Buckley, after three years with the Wisconsin Geological Survey, seven years as director of the Missouri Bureau of Geology and Mines, and four years professional service as a mining expert, announces that he has opened an office as a consulting mining geologist and engineer, at 1364 Peoples' Gas building, 122 Michigan Ave., Chicago.

Lewis Stockett, of Hosmer, Crow's Nest Pass, B. C., chairman of the Western Coal Operators' Association, was at Lethbridge, Alberta, on Oct. 13-14, to meet representatives of District No. 18, United Mine Workers of America, to discuss a proposed settlement of matters in dispute and which led to the strike of the mine employees in April last.

A. J. McNab, for the last three years superintendent of the Consolidated Mining and Smelting Company's lead and copper smeltery, at Trail, B. C., has resigned that position to join the staff of the Mason Valley Mines Company, at Mason Valley, Nev., under Jules Labarthe, formerly manager at Trail. J. Buchanan, who has been assistant superintendent at Trail, has been appointed superintendent in succession to Mr. McNab.

R. W. Brock, of Ottawa, director of the Geological Survey of Canada, has been seriously ill in British Columbia, where he went on an official trip, having left Ottawa about the middle of August. He accompanied Louis Reyersbach and Hugh F. Marriott, of London, and G. G. S. Lindsey, of Toronto, Ont., to Vancouver, and thence to Prince Rupert, B. C. Afterward, when in the Skeena River district, he was taken ill, and was removed to the hospital at Prince Rupert. When convalescent, several weeks later, he returned to Vancouver, and intended to continue the journey to Ottawa by such stages as should be found safe in his weak physical condition.

It is announced that Alfred H. Brooks has declined the offer of the position of chief geologist of the U. S. Geological Survey. Mr. Brooks has requested of Secretary Fisher the privilege of continuing his work as head of the Alaskan Division of the survey, rather than accepting the offer as chief geologist. While regretting Mr. Brooks' choice, both Secretary Fisher and Director George Otis Smith of the survey, have approved the same and Mr. Brooks will continue in charge of the Alaskan geologic work. Mr. Brooks states that he has reached this

decision after a careful consideration of the matter, and that he believes that his field of greatest usefulness lies in the continuation of the administration of the work in Alaska, which he believes has in reality hardly been begun.

+ OBITUARY +

John Hartwell Hillman, Sr., died in Pittsburg, Oct. 10, at an advanced age. He belonged to the old school of iron manufacturers. He made charcoal pig iron before the Civil war in the old cold-blast charcoal furnaces of the type that existed in Ohio, Pennsylvania, Kentucky, Tennessee and Alabama, afterward puddling this iron and selling it in the form of charcoal blooms and boiler plate. He was the fourth generation of his family that had been in this business, his father having manufactured iron in Kentucky, Ohio and Tennessee, and his grandfather and great-grandfather in New Jersey and Pennsylvania. Mr. Hillman's grandfather manufactured charcoal iron during the Revolutionary war and made cannon and cannon balls. J. H. Hillman, Sr., manufactured charcoal iron for cannon and cannon balls during the Civil war. He was on the Confederate side and fought under General Forest, although his father was a Union man. After his father's death he continued in the manufacture of charcoal iron and boiler plate until the advent of steel boiler plate. Mr. Hillman moved to Pittsburg in 1886 and started the brokerage firm of J. H. Hillman & Co., which later became J. H. Hillman & Son. Mr. Hillman was first to bring Southern coke pig iron into Pittsburg, shipment being made by river on coal barges returning from Southern trade. This was almost 25 years ago. About 1893 he became interested in Connellsville coking coal and was one of the pioneers in the opening up of the lower Connellsville or Klondike district. He later became interested in the manufacture of the coke himself and continued in this business up to the time of his death. He was a member of the Sons of the American Revolution, the Duquesne Club, and a number of other societies and clubs in the Pittsburg district.

SOCIETIES and TECHNICAL SCHOOLS

Mining and Metallurgical Society—The San Francisco section held a dinner and meeting at the Fairmount hotel, San Francisco, on Oct. 16, which was attended by 51 members and guests, one of the guests of honor being Dr. R. W. Raymond. S. B. Christy, chairman of the section presided. Present at the meeting were F. W. Bradley and C. W. Goodale, vice-presidents, and W. R. Ingalls, secretary of the society. Following the dinner there was a general discussion of the Alaskan coal question.

Editorial Correspondence

San Francisco

Oct. 18—The presence of Dr. George Otis Smith in San Francisco at the closing sessions of the meeting of the American Institute of Mining Engineers has stimulated interest in oil-land legislation. While a chief objective point of Doctor Smith's visit in the West is the potash explorations being conducted by H. S. Gale, of the Geological Survey, near Fallon, Nev., he has made it a part of his work to meet some of the petroleum producers and urge prompt action by California oil men in the matter of legislation. Doctor Smith said: "I am gratified to hear California oil men express themselves as more favorably disposed to a leasing law for the public oil lands. Such legislation is bound to come when the Western people get back of the movement, and the law that is framed with the active coöperation of the men on the ground will be certain to safeguard most effectively the interests of the public, both producers and consumers." There has been much talk, both pro and con, respecting the leasing of oil lands by the Federal Government and most of this talk has been by and for California interests. To the casual reader it might appear that there are no other petroleum interests to be served and that what California says will be final, irrespective of the inclinations of the producers of other States. While it is, of course, not true that California is the only State vitally interested in the legislative outcome, it is true, beyond question, that the outcome must depend largely, if not wholly, upon the action or inaction of the petroleum producers and consumers of this State. Under the leadership of California the Western oil producers can accomplish a satisfactory leasing law in the next session of Congress; it is beyond question that if they neglect this opportunity there will be no satisfactory legislation of any sort on the subject. It will be a leasing law or nothing.

The most interesting feature of the entertainment of the members of the American Institute of Mining Engineers, viewed from the practical side, was the visit to the dredging field at Natoma, on American river, on Oct. 13. The visitors were carried in automobiles from the dredge town of Natoma to the bungalow of C. N. Derby, division manager, where a luncheon was served and a short address delivered by E. H. Benjamin, chairman of the entertainment committee, responded to by Newton Cleaveland, general manager of the Natomas Consolidated and other dredging and reclamation operations of the Hammon interests in California. The afternoon was spent in visit-

Reports from our own
Representatives on
Important Events from
Many Important Min-
ing Centers of the
World



ing the dredges in operation and one of the rock-crushing plants. The chief attractions were dredges Nos. 8 and 9, which went into commission during the present year, the former in January, the latter in September. These are two of the four largest dredges in the State, built by the Yuba Construction Company, and operated by the Hammon interests. They are of 15-cu.ft. bucket capacity and theoretical digging capacity of 55 ft. below the water line, with a maximum theoretical yardage of 650 cu.yd. per hour; each has a total weight of 4,640,862 lb., and contains over 2320 tons of construction material. Much has been written and read regarding these boats, but this is the first time in the history of dredging in California or elsewhere that nearly 100 mining engineers in a single body have had the opportunity to witness the operation of the finest type of the modern bucket-elevator gold dredge of the largest bucket and yardage capacity that has been constructed.

Denver

Oct. 17—Great damage has been done by the recent floods in the San Juan region, and naturally the mines will suffer temporarily from lack of transportation of such of their ores as go out by rail for treatment. Between Silverton and Durango, miles of track were washed out and the ore from the former camp cannot reach the smeltery at Durango, which it is reported will be closed. Telluride has also suffered, and between Placerville and Ridgway the stages have been put in commission again; the Animas, Dolores, La Plata, Mancos and Dolores rivers and their tributaries were all on the rampage and great damage was done. This, however, has been largely exaggerated by the press, and the Denver & Rio Grande railroad, which serves that country, is rapidly repairing damages.

The first of a series of "Practical Talks" on ore mining was held last week at Idaho Springs. The idea of these meetings is to stimulate mining along profitable lines by the interchange of

views regarding mining and metallurgical methods, and the spreading of up-to-date information on these subjects. They were arranged jointly by the Colorado Scientific Society and the State School of Mines. There was a large attendance of mining men from Denver and the Clear Creek county districts. It is planned to hold similar meetings at such other mining towns of the State as may request them.

The vast possibilities of water power in this State have apparently given a tremendous stimulus to the use of electric power in the mines and the installation of electrical machinery. For this reason the recent electric show at Denver was largely attended by mining men from all the districts, the department pertaining to that industry being unusually large and interesting and the machinery houses of Denver being most extensively represented. The chief mining-machinery exhibitors in this line were the Hendrie-Bolthoff company, Denver Rock Drill and Machinery Company, Mine and Smelter Supply Company, Allis-Chalmers Company, Fairbanks-Morse & Co. and Stearns-Rogers company. The exhibition was under the auspices of the Colorado Electric club, W. P. Carstarphen, Jr., president. The chairman of the committee on mines is Gen. Irving Hale. The benefits already conferred by the development of electric power are enormous. One notable instance is that of the high mining camps of Montezuma and Argentine, in the Snake River districts of Summit county. The mines contain large bodies of low-grade, silver-lead and zinc ores, which it was found impossible to work at a profit because of the cost of coal at the mines, the miners of Argentine having to haul coal 18 miles by wagon from the end of the railroad. Now many of these mines can be operated at a profit and are being actively worked after lying idle for 15 or 20 years. Even the dumps of 15 years ago are being concentrated profitably.

The Red Mountain district between Ouray and Silverton is again becoming active. It will be remembered as the home of the Yankee Girl, Guston, Silver-Bell, Congress and other phenomenally rich producers of silver in the '80s, but which, since the silver slump of 1893, has been worked only in a spasmodic and desultory manner. About three years ago a revival was attempted by George Crawford, one of the original and successful operators. He started a long development and drainage enterprise known as the Joker tunnel, through which the lower workings of the Guston, Genessee, Vanderbilt and Yankee Girl were

to be reached, and other properties which he had taken over developed *en route*. But he failed to meet his financial obligations and that gave the district another setback. Now, however, it appears to have its "second wind," and a great deal of work has been done during the summer with encouraging results. Several large enterprises are under way; the district is a rich one and has been only partially developed.

Butte

Oct. 18—An answer has been filed by the Anaconda company in the suit of Richard Hancock's heirs against the Anaconda company and the Butte & Boston company, for a 1/10 interest in the Wild Bill lode claim, claiming that its title is clear. It is asserted by the Hancock heirs that the administrator of their property, Edward Gleason, had no legal right to transfer the property, and the Anaconda company claims its title was acquired by purchase from Lee W. Foster and Jeremiah Roach, holders of the patent. Against the assertion of the plaintiffs that \$5,110,000 worth of ore has been mined from the property since 1899, the Anaconda company says that only \$750,000 has been mined, and \$300,000 more developed with a development cost of \$200,000. The statute of limitations is also pleaded by the defendant company.

Production at the East Butte property remains about 1,000,000 lb. per month, and the quarterly report to be issued soon is expected to show practically the same results as last quarter; with earnings between \$40,000 and \$50,000 per month, although owing to the fact that one of the furnaces of the smeltery had to be shut down during August for repairs, production will probably be a little less for the last quarter. The improvements in the surface plant have been somewhat delayed, owing to delays in the arrival of machinery and to the arising of mechanical difficulties which were unlooked for, but it is anticipated that the work will be completed early in the spring, and on account of the poor metal market the management is just as well satisfied that the improvements will not be completed as soon as originally estimated.

The old mining camp of Rochester, between Twin Bridges and Melrose in Madison county, which once gave employment to a large number of men in its mines and which has been shut down for the last few years, is again the scene of activity and it is probable that considerable ore will be produced there before another year has passed. Recently California men sent Gordon Bradley to inspect some of the properties there, and on the strength of his report several adjoining claims were purchased by them, which they will begin developing as soon as arrangements can be made.

Salt Lake City

Oct. 19—A cross appeal in the case of the Silver King Consolidated Mining Company versus the Silver King Coalition Mines Company has been filed. Judgment for \$737,007 was awarded the plaintiff several months ago for its one-half interest in ore extracted from the Parsons stope by the Coalition. The Coalition has appealed from the first judgment in the circuit court and the hearing is set for September, 1912. A \$1,000,000 bond was necessary for the defendant's appeal, and this has been filed. If the judgment is confirmed, interest at 8 per cent., amounting to between \$58,000 and \$59,000 per year, will accrue. The cross appeal asks for \$3,075,327, the amount asked for in the original complaint and is directed to the court of appeals. Aside from the higher judgment asked for, one of the objects of the appeal is to expedite the case by bringing both sides before the court of appeals at the same time. The hearing of the case occupied nearly a year.

Col. E. A. Wall's offer of \$2 per share for 50,000 shares of the stock of the Daly Mining Company has been accepted and the proposed merger with the Ontario will not take place. A holding company of 300,000 shares, par value \$5, was planned, the stock of which was to be divided, 75,000 shares on a basis of one share for two of the present stock going to the Daly, and 150,000 shares to the Ontario. The later is on a basis of share for share. At the recent stockholders' meeting of the Daly company, the merger was opposed by the minority stockholders who did not consider the ratio of exchange sufficiently favorable, and C. B. Jack, acting for Colonel Wall who led the opposition, offered to purchase 50,000 shares of Daly stock at \$2 per share. The 50,000 shares with 25,826 already owned by him, give Colonel Wall the controlling interest in the Daly, which is capitalized for 150,000 shares. Colonel Wall intends to begin mining as soon as possible. There is much undeveloped ground in the Daly below the 900-ft. level; it lies between the Ontario and the Daly West, having the same vein system. The Daly has paid \$2,925,000 in dividends, the last payment having been made in June, 1897.

The report of John Dern, president of the Consolidated Mercur Gold Mines Company, Mercur, Utah, contains the following frank statement as to condition of affairs of that company: "During the year ended June 30, 1911, the most strenuous efforts barely saved the company from running behind; indeed, six out of the 12 months actually resulted in deficits, while in the other six there was profit enough to recover the loss. It is obvious that under these desperate conditions the company cannot hope to keep going long and the con-

tinuation of active operation for more than a limited period is contingent upon more favorable developments in the mines. Unfortunately, prospecting during the last year has given little or no cause for encouragement, and it is a matter of deep regret that I cannot utter any words of reassurance at this time. The candid fact is that the company is cleaning up the mines, and it is a question how long it can continue to make expenses. As soon as it becomes evident that operations will no longer pay expenses, it is obvious that the interest of the stockholders will be best conserved by shutting down. Meanwhile, prospecting has not been abandoned, and there always remain possible developments that will prolong the life of the mines."

Porcupine

Oct. 19—The financial statement of the Northern Ontario Exploration Company has been received by the shareholders. It shows that the company received \$507,000 in stock subscriptions and that between Jan. 17 and June 30, it made a profit in trading in shares of \$336,000. This was probably the company's turnover on its Hollinger shares. The company has shares in other companies that cost \$430,000 and has in addition \$404,000 in cash. After the charges for formation and other expenses are deducted the profits are given as \$315,105. In all, 110,325 shares have been subscribed and fully paid up, and the balance of the shares, 280,575, of a par value of £1 each, are under option to the subscribers of the original working capital, at par, until Jan. 31, 1913, in accordance with the terms of the agreement entered into at the time of the incorporation of the company.

Toronto

Oct. 21—Since the recent discovery of mercury in the ore of the Nipissing mine at Cobalt investigations have been undertaken by the Ontario Bureau of Mines to ascertain in what combinations of mineral bodies it occurs and whether it exists in sufficient quantities to make the discovery of commercial worth. The ore of the Silver Islet mine, a famous old-time producer, was known to contain mercury, and in the early days of Cobalt, Prof. W. G. Miller endeavored to find it in some of the Cobalt ores but was unsuccessful.

In regard to the reported discovery of gold on the coast of Labrador, the officials of the Geological Survey of Canada state that such discoveries have been reported several times but have led to no practical results; they are disposed to doubt the alleged strike. Explorations by the staff of the Survey in that part of the country have noted geological conditions but there have been no close examinations. No indications of gold have been observed.

The Mining News

Alaska

A new strike has been made on Grant lake, about 30 miles from Seward. The vein is white quartz mixed with hematite and carries free gold plainly visible to the naked eye. The vein is 2 ft. wide. Owing to the favorable situation it will be an ideal place to operate. As a result of the recent rich strike in the Port Wells district, there is a stampede for that section. A townsite has been selected and is to be called Golden.

Ellamar—This company shipped 2000 tons of ore during the last month to the Tacoma smeltery, showing good returns. L. L. Middlecamp, Ellamar, is manager.

Alaska-Treadwell—The SS. "City of Seattle" reached Seattle, Oct. 7, with \$400,000 in gold bullion from this property.

Kenai-Alaska—The final cleanup of the season has been made on this property, and the mill closed down for the winter. Additional machinery will be installed in the spring. James R. Hayden, Seward, has charge.

Alice—Charles Harvey, half owner of this claim, has bonded his share of the property to Col. B. F. Millard, of Valdez, who is making plans for the development. Samples show high assays in gold.

Scheuyemere—This company is contemplating the installation of a stamp mill on the property, at the head of Cleary creek. Whitney C. Clark, Fairbanks, is president.

Alaska-Mexican—During the month ended Sept. 15, the mill crushed 18,763 tons of ore, yielding \$56,242 gross and net \$22,246. Operating expenses were \$33,995; construction, \$6202. The ore averaged \$3.02 per ton.

Alaska-United—During the month ended Sept. 15, the Ready Bullion and 700-ft. Claim mills crushed 36,232 tons of ore, yielding \$95,537 gross and net \$33,597. Operating expenses were \$61,940; construction, \$10,756. The ore at the Ready Bullion mill averaged \$2.65; 700-ft. Claim, \$2.67.

Arizona

GILA COUNTY

Live Oak—Shaft No. 2 is down 890 ft. and is still in ore, but of lower grade than that disclosed in the upper portion of the orebody, which was reported to average more than 3 per cent. copper. One drill hole is now in ore. It is expected that the orebody will be cut within the next hundred feet of crosscutting. The Ray Consolidated Copper Company, through one of its engineers, is making an independent sampling of No. 2 shaft as it progresses.

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

Old Dominion—It is reported that the Kingdon shaft has been damaged by fire. Buildings and machinery were saved and the shaft was bulkheaded.

Summit—The company, operating under lease and bond the old Gibson mine, 16 miles west of Globe, has discontinued work for the present. Three men will remain to keep the mine free of water. There is some 20 per cent. copper ore in the bins and this is being shipped. A notice was posted to the effect that the shutdown was thought to be temporary and that it is hoped to resume operations shortly with a larger force of men than has been employed for some time. The men are allowed to remain at the camp rent-free, pending resumption of work. This mine is credited with a gross production of \$1,250,000 during its operation by the original owners, the Gibson Copper Company.

Superior & Boston—The McGaw shaft is now below the twelfth level. It will be sunk 20 or 30 ft. deeper, when the twelfth-level station will be cut. At about the tenth level the shaft passed out of the quartzite hanging wall, through the vein and into the diabase foot wall. It is estimated that the crosscut to the vein on the twelfth level will be between 30 and 40 ft. long. The mine is making 700,000 gal. of water per day, only a small portion of this coming from the shaft. There is no other development work going on at present. About 50 men are employed.

Arizona Commercial—The mine is still idle pending the company's reorganization.

Globe Western—The company has suspended work owing to financial difficulties. Vigorous efforts are being made in Globe to further finance the company and to resume operations. The inclined shaft was being sunk below the fourth level and drifting was in progress on the first, third and fourth levels previous to closing down. Streaks of ore from 2 to 3 ft. wide, consisting of pyrite and chalcopyrite in a silicious gangue, are re-

ported to have been disclosed on the third and fourth levels.

Old Ironsides—It is reported that a streak of rich silver ore was uncovered last week on this claim of the Copper & Silver Zone group, two miles east of Globe. This group of 22 claims adjoins the United Globe ground of the Old Dominion Copper Company and is owned by H. W. Clark, of Globe, and associates. These claims have been superficially worked for their copper-silver ores for several years.

Miami—In the fourth section, Hardinge mills are being tested against chileans. The fifth section is expected to start Nov. 1. The Deister No. 2 tables and slime tables are doing excellent work. The mine easily keeps the mill supplied with ore and a reserve of broken ore is accumulating in the stopes. The crosscut to the orebody on the 570-ft. level is being steadily advanced from the main shaft. This will be the second tramming level. The new Nordberg duplicate power-house equipment is beginning to arrive.

Inspiration—T. R. Drummond, manager, expects soon to receive orders to begin surface construction. A force of engineers is being assembled at the mine and now numbers 10 men, including construction and other engineers. Test pits are being sunk at the dam to determine the character of the underlying rock and its depth below the surface. The experimental mill is being altered and new equipment installed; the site for the proposed 5000-ton mill has not yet been selected.

Keystone—One churn drill is still operating on the property lying between the Inspiration and the Live Oak. There is no underground work going on. It cannot be learned whether the ore reserve is being increased by churn drilling.

SANTA CRUZ COUNTY

Gold Hill—J. F. Orosco, owner of this group of gold claims, about two miles west of Mt. Hopkins, has closed a deal with Richard Haake, formerly machinist of the Cananea company, to install a mill on the property. The ore carries about 1 oz. gold and a little silver. The property has been developed on the surface, and as the gold is found in a porphyry and is disseminated over a large area, future developments will be awaited with interest.

Madera—This company is now at work on a road to the mine, being made to facilitate the delivery of machinery at the shaft. The road work will be pushed as rapidly as possible, and a deep shaft sunk.

California

AMADOR COUNTY

Extension—W. W. Coates, a creditor of this property, has taken possession on court judgment for \$7964.

Poundstone—The installation of an electric pump is contemplated, when the electric power line is completed, connecting the mines with Sutter Creek.

BUTTE COUNTY

Stanley—A new tunnel is being driven in this gravel mine on Philbrook creek, at the rate of about 5 ft. per day. The gravel which shows a 150-ft. face in another working, is reported to average \$1 per car. B. B. Meek, E. B. Ward and others, of Oroville, are owners.

CALAVERAS COUNTY

Petticoat—This mine, at Rail Road flat, has been unwatered and will be given expert examination. J. E. King is manager.

Boire—The gravel mine, at Rail Road flat, made a cleanup recently, indicating increased pay in the gravel as the property is developed.

ELDORADO COUNTY

Davidson—A favorable report of this mine, recently taken over by a Paris syndicate, has been made by G. Blanchin. A 25-h.p. hoist, 45-h.p. boiler and other machinery have been installed and surface improvements have been made. A stamp mill is contemplated. W. E. Blackmer, Eldorado, is superintendent.

HUMBOLDT COUNTY

Arthur Hunter and Thomas Bair, of Eureka, are installing a test cyanide plant to determine the grade of the ore and the capacity equipment with the purpose of installing a permanent cyanide mill on Klamath river, 10 miles above Orleans.

Horse Mountain Copper—It is reported that an order has been given for the construction and installation of a leaching and concentrating plant, to cost about \$4000, to be delivered in November.

INYO COUNTY

Wilshire—E. W. Walter, of Colorado, has been employed to make an examination of this mine on Bishop creek, to determine the character of mill to be installed.

MADERA COUNTY

Mount Raymond—Oakland men have become interested in this old mine. The trail will be widened into a wagon road and preparations made to operate on an economical basis. The ore shows traces of gold and silver, but the chief content is copper. George J. Mains is manager.

MARIPOSA COUNTY

Bondurant—Some rich ore has been uncovered in the 300-ft. level. The mill and the compressor are operating regularly. Concentrates are being shipped to Selby.

MODOC COUNTY

Big Four—The new 5-stamp mill is under construction, and is the third mill to be installed in the Fort Bidwell district.

White Lily—The small mill near Seneca is being replaced by a 10-stamp mill purchased from the Long Valley Mining Company, whose mine near Greenville is to be closed. It is well equipped with water power, but the substitution of electricity is contemplated.

Fort Bidwell—Five new stamps are to be added to the five-stamp mill, and are expected to be dropping in November. Medium-grade ore is being milled from a 5-ft. vein, carrying some high-grade ore. It is expected that the Western Pacific railroad will reach Pine creek in November, thus reducing the wagon-road distance to about eight miles. J. M. Stone is president.

SACRAMENTO COUNTY

Union Dredging—The contract with the Bucyrus company for the construction of a 9-ft. dredge for this company, near Folsom, has been sublet to the Yuba Construction Company, of Marysville. Work in preparation for the dredge installation is in progress.

SIERRA COUNTY

Dixie Queen—The owners of this quartz property, at Round lake, have received the final payment from the Round Lake Mining Company, that has had the mine bonded. Martin Miller has charge.

Ante Up—The ore from the bonanza shoot in this mine assays \$2700 per ton gold. The shoot is 2 to 4 ft. wide, and about 20 ft. long. The ore is ribbon quartz and is hard, the metal being largely in form of free gold. Horace Morse and associates have the property bonded.

Taft-Sherman—The vein on this property, in Jim Crow cañon, which is being developed by an open-cut, assays \$57 per ton gold. Jesse Carney is the owner.

Kate Hardy—The reported sale of this mine in the Forest district is denied by Dan McGonigal, the reputed purchaser.

SHASTA COUNTY

Mammoth—The new 8x10-ft. tunnel has been driven 1500 ft. in five months; it will be advanced to 2200 ft. Another tunnel, 500 ft. long, has also been driven.

YUBA COUNTY

Pennsylvania—The dumps of this mine and the Donnebrouge will be worked with machinery operating on the principle of the arastre. J. C. Campbell, Browns Valley, is manager.

Elk Gold Mining Company—This is a new incorporation to operate in the Indiana Ranch district. The company has purchased the claims of J. J. Haggin & Sons and the Scott property. Otto C. Wullburger, Marysville, is president and treasurer.

Colorado

CLEAR CREEK AND GILPIN COUNTIES

The Robert Emmett and Queen of the West mines, which have been idle for many years on account of water conditions, are now being opened and worked under bond and lease. It is stated that the Emmet has 21,000 tons of pay ore blocked out, and that there are large resources in the Queen. Contracts have been let for 2000 ft. of development.

Pioneer—The mine in the Georgetown district has been reopened by S. Work, lessee. High-grade gold ore was produced by this mine in the early days. A force of about 20 men will be worked.

Vesper—A strike has been made in this mine and a 200-lb. test taken from a streak of ore seven inches wide gave 108 oz. silver and 5 oz. gold per ton. This ore is now being drifted on.

Capital—On the Aetna vein 14 in. of high-grade galena have been opened on the 400-ft. level. Gold is the chief metal, but is associated with silver, lead and copper. Between raises Nos. 8 and 9 on the same vein, Tong, McCluskey & Co. are shipping from a 10-in. streak, the first consignment of which returned \$72 per ton in gold and silver.

CRIPPLE CREEK DISTRICT

Colorado Boss—From a new vein opened in this mine, a car of ore has been shipped, which yielded between \$50 and \$60 per ton. The low-grade ore in the vein is said to average about \$20 per ton.

Gold Dollar Estate—Lessees on this property shipped 1100 tons in September, from which the company received \$2200 royalty.

El Paso—The September output is given at 150 cars of 1-oz. gold ore.

Isabella—Twenty cars of 1-oz. gold ore were shipped from the Lee shaft in September. The shaft has reached a depth of 1380 feet.

Mohican—From this mine on Battle mountain two carloads of ore per week are being sent out by Husted & Ecton, lessees. A strike of high-grade ore has been made in the second level.

Elkton—A mill for the treatment of the dumps has been under consideration, but the owners of ground suitable for the site held the price so high that it was decided to defer the building of the plant.

Ramona—This mine is sending out two cars per month of good ore. Hanby & Anderson are the lessees.

Jerry Johnson—The output of this mine for October will be about 40 cars of good mill-grade ore; Frank Caley, lessee.

Vindicator Consolidated Company—The shaft sinking to the 1600-ft. level has been completed and also the cutting of a station at that point. Pumps will be installed at once and the lower levels will then be developed.

LAKE COUNTY—LEADVILLE

Miller—On this property in Lackawanna gulch it is reported that an 8-ft. vein has been opened in the lower tunnel that averages \$12 per ton milling ore. The company now has enough ore to keep the mill running all winter.

New Discovery—It is reported that carbonate of zinc ore has been found in all of the three shafts, the average yield being 29 per cent. zinc as shown by the actual smeltery returns.

Yak Tunnel—In the Cord winze in this tunnel a body of sulphide ore is being developed and a total of 150 ft. will be sunk giving a depth of 1400 ft. from the surface and reaching the granite formation.

Sugar Loaf Consolidated—This tunnel is being driven ahead steadily and high-grade silver-lead ore is being shipped regularly from the Sherrell vein.

SAN JUAN DISTRICT

Suffolk—This mine, at Ophir, has been reopened.

Idaho

COEUR D'ALENE DISTRICT

Hecla—The company has awarded the contract for 300 ft. of shaft sinking. The contract figure is approximately \$45 per ft. The shaft is a three-compartment one and the additional depth will open up the 1500-ft. level, the levels in the Hecla being 300 ft. apart. This is 100 ft. more than the common Coeur D'Alene practice. The new part of the Hecla shaft is expected to be in working order by April.

Granite-Allie—This property, situated in the Murray district, is to have a mill in the near future, engineers at present being at work on the plans for a 200-ton concentrating plant. A sawmill on the property has begun cutting the timber for the new plant.

Marsh—This company has let a contract for 200 ft. of shaft sinking. New stoping ground is necessary to keep the mill running at capacity. The ore in the upper workings is playing out and for some time only a part of the necessary mill feed has been produced.

Caledonia—Manager Charles McKinis states that about Sept. 25, the hanging wall of the fault was cut; since then the ground has become more settled, and less water and better progress have been made. Horses will be used in the future for tunnel haulage. The new high-voltage line is completed, and the railroad survey has been run to the tunnel; construction is expected to start soon. The first raise will be started as soon as the ground becomes more solid and ore is expected soon after. Foundation for the machinery is in place and a 16x4-ft. compressor house and a 16x30-ft. dry and change house have been completed.

Michigan

COPPER

St. Louis—This property, being opened by the Calumet & Hecla, has its shaft down over 100 ft. with the temporary surface equipment completed, and everything about the property in shape so that operations can be carried on throughout the winter without interference. The shaft is sinking on what is known as the St. Louis amygdaloid lode. Several drill cores have been taken from it at various depths and so far the shaft shows it to be well mineralized.

Adventure—No. 5 shaft, sinking vertically to open the lodes disclosed in drilling, is down about 1525 ft. and has cut the first two lodes of the series. These are now being drifted upon. A station is being cut at a depth of 1520 ft. and a crosscut will be driven to open lodes Nos. 2 and 3 at this depth. No. 1 lode was reached at a distance of 980 ft. from surface, and the second at 1028 feet.

Algolah—The shaft at this property is sinking in ore below a depth of 175 ft. Drifting south from the 104-ft. level has been temporarily suspended at a distance of about 900 ft. from the shaft. The north drift continues toward the Lake boundary and is breasted in ore of about the same grade, at a distance of about 950 feet.

Senter-Dupee Development—This company has suspended operations on the lands held under option in Keweenaw county, near Gratiot lake. Several drill holes were put down and some trenching was done. While some copper-bearing lodes were revealed, nothing to warrant development at this time was disclosed.

Ahmeek—The drift connecting the Nos. 3 and 4 shafts at the 10th level has encountered a run of high-grade ground. Results at the mine and mill continue most satisfactory, about 2000 tons of rock per day being handled.

Isle Royale—It is reported that development work has again been discontinued at A shaft on the Baltic lode.

IRON

Chapin—The Hamilton shaft of this mine, on the Menominee range, at Iron Mountain, is to be lined with concrete. Work is to start at once. This shaft is approximately 1450 ft. deep and is 24 ft. 4 in. by 9 ft. 8 in. inside dimensions, and the work to be undertaken is the largest of its kind ever undertaken in the Lake Superior country. The shaft was originally used for hoisting ore, but recently was employed solely for men and supplies. With the completion of the concrete lining it will probably again become an ore producer.

Princeton—Due to the small amount of ore shipped from the property this season, the stock pile is one of the largest on the Marquette range.

U. S. Steel—This corporation is reported to have decided to explore a large tract six miles southeast of Gwinn, in the Swanzy district of the Marquette range. The contract for the work is said to have been awarded to the Duluth Diamond Drill Company.

Baron—A diamond drill is being operated east of the mine to explore the formation in that direction. Two hundred men are employed at the mine.

Salisbury—This Cleveland Cliffs mine, at Ishpeming, is being temporarily closed to permit of shaft repairs. It will probably be out of commission for about a month.

Minnesota

CUYUNA RANGE

It is believed that the Northern Pacific railroad is back of the projected activity on Section 30, on the south range near Deerwood. It is known that this railroad is interested in ore lands in this vicinity and it is rumored that it will look to this range for its ore tonnage.

Kennedy—According to the records of the Soo dock at Superior the mine has shipped 123,500 tons of ore this season. The stockpile this winter will be larger than last year.

Cuyuna-Mille Lacs—Under the direction of Captain Lanyon, lumber and material are being hauled to the property, and a good-sized camp is being established.

Meachem—Shaft sinking at this Rogers Brown mine is reported to have temporarily ceased at a depth of 256 ft. At this depth the shaft was making water rapidly.

MESABI RANGE

Regarding the Great Northern ore lease, press reports quote W. J. Olcott, of the Oliver Iron Mining Company, as saying: "The lease calls for giving at least three years' notice of intention to cancel and that will be given shortly. Cancellation will take effect Jan. 1, 1915. Directors considered the proposition very carefully and decided that this was the right thing to do."

Leonidas—Employees are moving into 25 new houses recently built by the company. The shaft is about 450 ft. deep and will ultimately be 620 ft. deep. Shipping is expected to start next season.

Buhl—The Oliver Iron Mining Company is reported to be drilling on land held under short lease from the Great Northern railroad and situated ½ mile west of the village. Good ore is said to have been found.

Du Pont—This company has erected a complete plant for the manufacture of black powder on the shores of Lake Carrie, near Wilpin. It is expected that operation of the plant will start in about three weeks.

VERMILION RANGE

Almar—Paint rock is reported in the drift and the breast shows soapstone and slate. An 18-ft. crosscut from the drift showed a soapstone wall.

Irona—It is reported that a shaft will be sunk on the property in S. 5-T. 62-R. 14. The company is buying new machinery.

Consolidated Vermilion & Extension—A diamond drill is reported to have encountered ore at a depth of 60 ft. The shaft is about 300 ft. deep.

North American—Water troubles are said to have disappeared, and shaft sinking is progressing. It is expected that drifting will be done at 300 feet.

Missouri

Joplin-Kentucky—This and the Cooper Mining Company, in the Chitwood camp, have consolidated.

Missouri Hills—B. M. Robinson has made a strike at Thoms Station on this company's land. Two drill holes show a 60-ft. face of 30 per cent. ore and the shaft already has a 25-ft. face.

Symmes—Morsman & Sly have bought this mine and mill in the Joplin camp and are operating it.

Minor-Graham—John Durby has purchased the Victoria and Clara Bell mines at Bell Center for this company.

Muskingum—This mill in the West Joplin sheet-ground camp has been re-modeled and the mine has started operations again.

Dutchman's Dream—This company, which made such a rich strike at Thoms Station, has a shaft down 45 feet.

Kraver & Barnes—The company has bought a 40-acre lease and three concentrating plants; it is also operating the Old Grand Central and J. C. mines in South Joplin.

Montana

BUTTE DISTRICT

Anaconda—Operations at the Badger State mine were resumed Oct. 15 and the mine is now operating at normal capacity, about 285 men being employed underground and on surface and an average of 600 tons of ore per day being hoisted.

East Butte—On the 1000-ft. and 1200-ft. levels extensive development is being done, but on account of the caving of old workings on the 1000-ft. level, through which the company expected to get out its ore, steady production from that level cannot begin before January. A body of ore averaging 7 per cent. copper, the extent of which is as yet unknown, has been opened on the 1200-ft. level. The two final payments on the Pittsmtont properties which were to have been made Dec. 1 next, will be put off for another year.

FERGUS COUNTY

Ford Creek—An examination of the property in the Cone Butte district, has been made by Charles Donohue for a syndicate of Eastern men, and it is thought that a deal for the purchase of the property will be definitely arranged within a few weeks. Ore sufficient to warrant the erection of a mill has been blocked out.

JEFFERSON COUNTY

Silversmith—A lease and bond has been secured by Butte men, on the Silversmith mine, south of Basin, and men have been put to work. This mine was a paying concern formerly.

Crystal—Control of the mine has been taken by Voto, Rossman & Haynes, of Butte, and operations will start there soon. This is one of the oldest mines in the district, the first work having been done in 1888. The vein averages nearly 70 ft. in width from hanging to foot wall, and a tunnel has been driven 400 ft. on it.

Ruby—The mill at the mine in the Lowland district, operated by P. F. Dowling, has been started again and three shifts are working in the mine and stamp mill.

Comet—A body of zinc ore uncovered some time ago on the 100-ft. level was not mined because of the high cost of sending the ore a great distance for treatment; the marked success in the treatment of zinc ores by the new processes used by the Butte & Superior company has determined the management to make tests of the ore and the mill at the property is being repaired for the purpose. The ore runs about $\frac{1}{3}$ higher in zinc than that of the Butte & Superior company. If the test proves successful, operations on a large scale will be started.

LINCOLN COUNTY

Libby Placer—The new hydraulic plant installed by the Libby Placer Mining company was recently completed and the company is now operating steadily and will continue until winter. With the new plant in operation an output of four times the former can be maintained.

Comet Placer—Owing to lack of sufficient water for operating purposes the company has suspended operations for the present.

MISSOULA COUNTY

Triangle—Extensive operations have been planned for this property lying $2\frac{1}{2}$ miles from Clinton. Work was first begun in 1906 and since then a tunnel has been driven 2000 ft., and a shaft sunk 40 ft. A 300-ton concentrator will be built at once. At present there is a good wagon road from the mine to the railroad, but when the mine is prepared to make regular shipments a spur from the railroad will be put in.

Nevada

CHURCHILL COUNTY

Nevada Hills—It is reported that the quartz dike has cut off the ore on the eighth level.

COMSTOCK LODGE

United Comstock Pumping Association—A report, just submitted by Superintendent Symmes, strongly recommends the reopening of the Combination shaft, Chollar-Norcross-Savage, which will make available the lower levels of the middle group of mines, as well as greatly improve the working conditions and ventilation in the Ward shaft, which is now a "blind" shaft, acting as its own upcast and downcast. It is proposed to place pumps at the Combination, unwater the intervening levels, relieve the pressure and to make connection with the Ward. This is the only possible method, according to the opinion of the superintendent, of opening the middle mines at depth and making them available for exploration and ore production. It is also the opinion of the superintendent that with the manufacturers delivering the new pumps, when agreed, for the C. & C. shaft, the new equipment, or a portion of it at least, should be on the ground by the first of the year.

Mexican—The framework of the new 100-ton mill has been completed and the corrugated iron is being placed on the sides and roof, so that the building will be inclosed before the December storms. The concrete foundations for the mortars are finished, and the other heavy machinery installed. Returns on ore shipped to the smeltery show it to be averaging over \$100 per ton.

Ophir—The returns from ore mined last week were \$23,737, the largest week, with one exception, this year. The average of the ore for the week was \$60.40 per ton. Preliminary estimates on the last run of 2000 tons of ore at the mill, place the net returns at about \$80,000.

HUMBOLDT COUNTY

Mason Valley—The smeltery is expected to go into commission between Thanksgiving day and Dec. 1.

NYE COUNTY

Tonopah—The report of the company for the month ended Sept. 30, shows that during that period 14,020 tons of ore were milled of an average grade of \$19.30 per ton, the total value of bullion recovered being \$198,370 and the net profits amounting to \$132,349.

Tonopah Belmont—The report shows that during the month of September, 7517 tons of ore were milled and 2299 tons were shipped to the smeltery, the gross proceeds of these 9816 tons being \$270,405 and the net profits amounting to \$144,972. Rapid progress is being made with the construction of the new

500-ton mill at the mine. It is estimated that all concrete work will be completed by Oct. 25, and erection work commenced at once. About 500 tons of structural steel have arrived.

Round Mountain—This company, operating a gold mine 60 miles north of Tonopah, reports that during the quarter ended Aug. 31 a total of 13,084 tons were milled at a total cost of \$4.50 per ton. The grade of the ore was \$7.79 per ton and the gross recovery was \$6.88 per ton, which, with miscellaneous earnings of \$3664, made the total gross receipts \$93,677. The net operating profit was \$34,762, or \$2.66 per ton. Cash on hand and bullion in transit amounted to \$97,057. The new mill is treating an average of 175 tons per day.

West End—During the fiscal year ended March 31, 1911, 16,164 tons of ore were sent to the smeltery, of a gross value of \$338,061, and net after freight and treatment, \$197,434. Total net profit was \$42,490. The average gross value per ton was \$20.91; freight and treatment, \$8.70; mine-operating cost, \$9.59, and profit, \$2.63. Additions to equipment were extensive and amounted to \$33,814. The underground developments were satisfactory and the company has leased the Midway mill with option to purchase.

New Jersey

Wharton—An accident at the mines of this company at Upper Hibernia, Morris county, resulted in the death of 12 men by drowning. A single blast at a depth of 1700 ft., at the bottom of the shaft, is reported to have weakened the wall which gave way, permitting water in old workings to flood the mine.

New Mexico

Ernestine—The company expects to have the new power plant in operation soon at its mine in the Mogollon district. The concentrator is treating about 720 tons per week.

Cooney—The Mogollon Gold and Copper Company is reported to have found considerable high-grade ore in this mine. Good progress is being made in development.

Consolidated—This mine, at Cerrillos, was recently acquired by the Sunset Mining and Smelting Company. A concentrator will be erected to be operated in conjunction with the smeltery. A quantity of ore is blocked out.

Deadwood—A larger hoisting plant will be provided for these mines in the Mogollon district. The output amounts to about 3600 oz. of bullion per week.

Chino—The management is reported to have decreased its drilling operations, only three drills being in use now as compared with nine formerly. These machines are operating in the Sierra and Estrella sections, or in the southwestern extension of the Carrasco orebody.

Oregon

Zenith—D. L. Willard, Bourne, manager of this property, in Baker county, has resumed operations and will complete the tunnel now started.

Ibex—This property is to be operated on a more extensive scale. A tunnel is now in 3000 ft. and other work will be started at once. David Ross, Sumpter, is manager.

South Dakota

LAWRENCE COUNTY

Reliance—The wet-crushing cyanide mill on this property is to be enlarged by the addition of 10 stamps. The plant at present consists of 20 stamps and is doing satisfactory work. M. E. Hiltner, Trojan, S. D., is superintendent.

Anaconda—Supt. A. E. Hall, is authority for the statement that funds have been raised for erecting a large stamp mill on this company's property, near Roubaix. Work is to be resumed immediately in the shaft, which is now 300 ft. deep, it being the intention to drift several hundred feet along the vein. The vein at this point is 45 ft. wide.

Mogul—J. V. N. Dorr, who has been consulting engineer for this company for a number of years, has been appointed general manager and has assumed his duties. The mill is handling about 400 tons per day and the mines are in better physical condition than for several years past.

PENNINGTON COUNTY

Forest City—This property has been sold to Denver men for \$30,000. They will immediately install a hoisting plant and will sink on the vein.

Mystic Dredge—This dredge, placed in operation June 1, has worked satisfactorily so far, although minor changes are being made. The screen opening is being enlarged. Heavy iron rings have been placed inside of the screen to break up clay balls, which have been found to contain considerable gold at certain parts of the ground.

Sherman Placer—This property, under bond to Canadian men, has been thoroughly prospected during the summer. A steam drilling rig was installed and over 100 holes put down to bedrock.

Utah

JUAB COUNTY

Tintic shipments for the week ended Oct. 13 amounted to 155 cars.

May Day—Ore on the 400- and 1000-ft. levels is reported to have been opened in good quantity. The company is operating at a profit.

Tintic Smelting—Suit has been brought by this company to collect a note for \$2478 from the United Tintic Mines Company, with interest at 8 per cent.

Uncle Sam Consolidated—Drifting is being done along a new break paralleling the former break and orebody.

Iron Blossom—The showing on the 600-ft. level of the No. 1 shaft has improved during the week. Gold ore assaying up to \$28 in gold and silver has been opened. In the No. 2 workings good lead-carbonate ore is being mined. A recent shipment of 60 tons from this place brought good smeltery returns.

Colorado—Two shifts are being worked and are producing eleven 40-ton cars per week. Most of the ore comes from workings on the 250 level near the Sioux line and above this about 400 ft. to the north. One shift is being worked on development on the 300.

Ridge & Valley—This property is being operated through the Gemini and the ore being shipped comes largely from the 1500- and 1600-ft. levels.

Gemini—Ore is being mined between the 1400 and water level. At present no work is being done below the 1650.

Victoria—The station on the 1200 was finished during the week and drifting is in progress to cut a vein about 200 ft. from the shaft.

Sioux Consolidated—Two cars per week are being sent out, largely from the incline below the 450-ft. level.

Crown Point—The drift on the 400-ft. level is being driven. The work is in limestone, showing occasional fissures with iron staining. It is possible that the shaft will be continued to deeper levels, in case nothing is encountered on the 400.

SALT LAKE COUNTY

Bingham Mines—Announcement has been made that the stockholders of the Dalton & Lark company will be asked to dissolve the corporation at the Salt Lake offices, Oct. 20. Control of the Dalton & Lark is held by the Bingham mines.

Yampa—Shipments of between 600 and 700 tons of copper ore are being made to the American Smelting and Refining Company, at Garfield, and the property is stated to be in condition to produce 1000 tons, if desired. It is said to be doing better than at any time in its history.

Ohio Copper—Shipments are reported to have increased from 1700 to 2000 tons per day, which average 1.35 per cent. copper. This is a marked improvement in the grade of the ore. F. A. Heinze has been in Utah recently, visiting the property. When the new Wall crushing equipment is installed, it is said that the property will be earning about \$20,000 or over net per month.

Utah Copper—Shipments over the Bingham & Garfield railway are reported to have been as high as 11,000 tons per day. The Denver & Rio Grande railroad has been handling the usual tonnage of

7500 tons, which makes a total of 18,500 tons per day being sent to the mills at Garfield.

Columbus Extension—At a special meeting, Oct. 2, the capitalization was decreased from \$1,500,000 to \$600,000 by increasing the number of shares from 300,000 to 600,000 and decreasing the par value from \$5 to \$1 per share. The company is \$12,500 in debt with about \$2000 cash on hand. Unless treasury stock can be disposed of, another assessment of 5c. will probably be levied.

Washington

Silver King—This company is contemplating the erection of a smeltery at the mine, near Gates, Marion county.

Tubal-Cain—Operations at this mine, in the Olympics, Jefferson county, have been suspended for the winter, owing to the fall of a heavy snow. The ore is high-grade copper, and further development work is planned for next spring. Frank Hanford, Seattle, is president.

Knob Hill—This company, in the Republic district, is making regular shipments of about six carloads of ore per week, which are assaying from \$35 to \$100 per ton.

Wisconsin

Mills—This mine, operated by the Wisconsin Zinc Mining Company, near Hazelgreen, is producing an average of 750 tons of zinc concentrates per month, working about 30 men per day. The average assay of the ore is 28 per cent. The company has installed a complete electric equipment with 340-h.p. motors and new machinery; it is one of the most complete plants in the Wisconsin field. The roasting plant and magnetic separators are now being operated successfully and the property is on a paying basis for the first time since it was opened up. The officers are Robert H. Lanyon, president; Elmer E. Baldwin, vice-president; C. M. Mohr, secretary and treasurer, all being Chicago men.

Canada

BRITISH COLUMBIA

A strike of silver-lead ore is said to have been made on the Tulameen river. The property is owned by a group of Spokane men who have a crew at work sinking a shaft.

Silver Creek—A copper find on this creek is reported by Archie Cooper. Small veins of native silver were also reported.

Cranbrook—George T. Carr, a Montana prospector, reports a strike of free milling ore on Perry creek in this vicinity.

Coronation—By next spring, it is believed sufficient ore will have been blocked out to keep the mill running for several years.

ONTARIO

Cameron Island—This property, situated 35 miles southwest of Kenora and near Shoal lake, which was recently purchased by a syndicate represented by D. M. Cameron and Frank Grew, will be reopened. There is a good plant, including a 10-stamp mill.

ONTARIO—COBALT

Cobalt shipments for the week were: McKinley-Darragh, 252,340; Cobalt Lake, 205,810; O'Brien, 74,620; Buffalo, 65,550; Hudson Bay, 65,000; La Rose, 64,790; Nipissing, 64,630; Right-of-Way, 62,700; Drummond, 60,000; total, 915,440 lb. Bullion shipments: Nipissing, 87,235 ounces.

Beaver—Ground is now being broken for the erection of a 50-ton concentrator. The crushing end will consist of two crushers and Hardinge mills.

City of Cobalt—The annual report shows production for the year of 292,695 oz. of silver. Liquid assets amount to \$53,094 and ore reserves are placed at 181,650 oz. A new vein has lately been cut at the 265-ft. level. It has been decided not to resume the payment of dividends, production having fallen off during the last six months, owing to the company's not being able to obtain a contract with a concentrator to treat the low-grade ore.

Savage—A new discovery of high-grade ore has been made on the 140-ft. level.

ONTARIO—PORCUPINE

Miller-Middleton—The first vein on this property to be opened up underground was cut recently at the 75-ft. level and shows good ore. The surface width of about 3 ft. is maintained.

Dome—A new and rich surface discovery has been made near the line of the Preston-East Dome.

Lucky Cross—Development of the recent discovery on this Swastika property is showing up some good ore.

Preston-East Dome—A find of a dike of porphyry over 300 ft. wide, containing quartz stringers in which coarse free gold appears, has been made on this property just south of the Dome line.

Brydges—A good surface discovery was made recently. Arrangements have been effected with the adjoining Preston-East Dome company and the latter will supply the Brydges with compressed air. Active development will continue and machine drills will soon be in operation.

Crown Chartered—This company, operating the Davidson claim, has reached the 100-ft. level in the shaft, having made the entire distance since Sept. 1. Crosscutting will be undertaken to pick up the vein, which dipped at the 50-ft. level.

Imperial—Charles D. Taylor, of California, has purchased a controlling in-

terest in the stock of this company, and will take an active part in the development of the property.

Hargraves—This company has begun development work on the three Campbell claims, north of the North Dome.

Mexico

CHIHUAHUA

Santa Diego—This Santa Barbara mine is temporarily in charge of R. W. Macfarlane, who is making an examination.

National Mining and Smelting Company—This company is now developing the Lustre mine in the Magistral district and it is expected that enough ore can be blocked out to continue profitable mining.

Reforma—Plans are being made to reopen this Santa Barbara mine which has not been operated for several years. It was formerly owned by the Hinds Consolidated Mining Company, but early in 1911 passed to the control of Cleveland men, it being sold at auction. Hoists and pumps are being purchased and work will be started under the direction of Frederick Mathew, of Parral.

Predilecta—At this mine in the Guana-cevi district the pumps have been recovered from the flood that occurred several weeks ago. The water is at normal level, and sinking to reach the 1000-ft. level will be resumed. The damage done by the flood will not exceed \$5000; at first it was estimated that the loss would be about \$15,000. D. R. Thomas is in charge.

Las Muertes—At this mine in the Minas Nuevas district, the equipment is to be enlarged to enable the mining of 250 instead of 80 tons of ore daily. R. H. Allen, Villa Escobedo, is in charge.

MEXICO

Esperanza—The returns for September, by cable, show that 22,942 tons of ore were crushed, yielding \$130,271 gross and net \$27,551. Expenditure for construction was \$1722.

Africa

TRANSVAAL

Gold production in September in the Transvaal is reported at 669,713 oz. from the Witwatersrand and 30,852 oz. from the outside districts; a total of 700,625 oz., which is 12,782 oz. less than in August, the decrease being due to the shorter month. The daily average, in fact, increased from 23,013 oz. in August to 23,354 oz. in September. For the nine months ended Sept. 30 the total production was 5,595,589 oz. in 1910, and 6,099,442 oz. or \$126,075,466, in 1911; an increase of 503,853 oz. this year. The number of mills at work on Sept. 1 was 68, with a total of 10,142 stamps. The number of negro laborers employed at the close of September was 199,284, a decrease of 1474 during the month.

The Markets

Coal Trade Review

New York, Oct. 25—The coal trade, like the iron and metal trades, is suffering to some extent from the disposition of consumers to buy only in moderate quantities and for early deliveries. Apparently nobody wants to put in large stocks ahead. In coal for manufacturing purposes this is to some extent understandable; in domestic coal, when requirements are pretty well known, it is rather unusual.

This disposition prevails throughout the coal trade in the West. Nevertheless there is a fair amount of current business, which may be expected to increase as cold weather comes on and winter demands begin to be felt. A fair estimate is that mines generally will average up to 70 per cent. of capacity, which is not altogether discouraging. Prices do not advance, but that is not to be expected as long as large customers know well that the market can easily be flooded with coal, should any cause for greater demand arise. Evidently there is a general disposition to accept the risks of the open market.

The seaboard bituminous trade is still rather quiet. Coastwise trade is increasing, but not more than usual at this season when the shoalwater ports begin to sit up and take notice. Offshore trade from Hampton Roads is good, and bunker trade there and at New York is fair.

Anthracite business is almost monotonously steady, and there is nothing new about it.

Coal tonnage of Pennsylvania railroad, nine months ended Sept. 30: Anthracite, 8,489,450; bituminous, 30,504,343; coke, 7,880,607; total, 46,874,400 short tons. This is a decrease of 1,677,883 tons from 1910, the loss being entirely in coke.

The Chesapeake & Ohio railway reports for August a total tonnage of 1,590,972 tons coal and 19,558 coke. For the eight months, ended Aug. 31, the road carried 10,266,525 tons coal and 129,473 coke; showing decreases, as compared with 1910, of 189,853 tons coal and 172,993 tons coke.

IRON TRADE REVIEW

New York, Oct. 25—The incidents most discussed this week are the proposed reduction of freights on iron ore by the Minnesota railroads, and the announced decision of the Steel Corporation to cancel its lease of the Hill ore lands on the Northern Mesabi as soon as the terms of the lease will permit. The former will take effect at the opening of the next season; the lease will not be ended till Jan. 1, 1915, over three years from

Current Prices of Metal, Minerals, Coal and Stocks, Conditions and Commercial Statistics



now. Both are discussed on another page.

So far as trade is concerned, there is little change. Finished products continue to sell well, but chiefly in moderate orders for early delivery. Buyers do not seem to be weakening in their conviction that prices are not likely to go up suddenly, and are adhering to their determination not to go far ahead. In the aggregate, however, they are making up a pretty large business. Competition for business continues and there are again reports of lower prices; notably in wire, which has been cut \$1 per ton, the leading interest meeting the lower quotations. Some good orders for railroad equipment are reported.

The large demand for nails, hardware and other material of this kind, indicates that low prices are stimulating building. In fact, it is the small consumer now who is supporting the market, so far as the volume of trade goes.

In pig iron there has been some good buying of foundry and basic iron in seaboard territory. Basic is in some demand in the Central West also. It is generally believed that unsold stocks of pig have been pretty well worked down, and that increases in orders must be met by increased activity among the furnaces.

Iron Trade Notes—The Western Steel Corporation, Seattle, is now in the hands of receivers who will serve until the creditors choose a trustee. Among the petitions which brought about the action was one signed by the Metropolitan Trust Company, of New York. This stated that that concern had made advances early this year of \$600,000 to the Western Steel Corporation and was willing to make further advances if President James A. Moore would retire from control.

Baltimore

Oct. 23—Exports for the week included 573,860 lb. zinc dross and 3,926,450 lb. steel billets to Liverpool; 2,036,950 lb. structural and miscellaneous steel to Port Limon, Costa Rica. Imports included 900 tons ferromanganese from

Middlesboro, England; 5800 tons manganese ore from Bombay, India; 11,400 tons iron ore from Cuba.

Birmingham

Oct. 23—The heavy production of pig iron in Southern territory is being kept up, but there is no accumulation of the product noticeable. However, the iron men say there is no new business coming in to amount to anything, and that shipments are on old orders. Be that as it may, the fact that there is no accumulation is the encouraging feature of the iron market in this part of the country. There is no talk of a curtailment in production in the near future. There are some inquiries coming in as to iron for 1912, but as far as can be learned very few sales have been made. Reports are current that some manufacturers are accepting business for the first quarter in 1912, but at the general offices of the companies nothing of a definite nature can be learned.

The steel situation remains unchanged. There is an active outward movement of steel-wire goods. Rails are moving steadily.

The cast-iron pipe trade is still active, the melt being good. As has been the case for some time, the pipe makers have been holding up the metal market.

Reports as to a merger between the Woodward Iron Company and the Birmingham Coal and Iron Company during the past week caused some interest.

Chicago

Oct. 24—Conditions in the iron and steel trades cannot be considered better than a week ago, in a broad sense. Pig iron is weak; it will continue weak indefinitely, to all appearances. Melters are buying as for several months past only what they need for immediate consumption or the foundry requirements of a few months ahead. The tendency almost everywhere is to be cautious in making contracts for supplies.

Southern pig iron brings \$10, Birmingham, or \$14.35, Chicago, minimum, on nearly all transactions for No. 2. The price of Northern No. 2 remains \$14.50, with possible concessions of 25@50c. on lots highly favorable to the seller. All these prices are on small lots and for delivery in the last quarter or first quarter; the tendency is to cut prices to the lowest figure possible, in making quotations for actual delivery early. For the first half there are few sales but many inquiries. Furnace agents seem in general more inclined to place their products than melters to buy.

Iron and steel products continue to be in light demand. Railroad purchases are

held down to the lightest possible needs; the roads will not buy until forced to do so. Steel bars in some cases sell below the 1.33c. minimum for Chicago delivery established by the Pittsburg price plus the freight, but only slightly and in rare instances; bar iron remains 1.175@1.20c. Contracts for structural material are for a light gross tonnage. Sheets and plates show no signs of improvement; wire products are still in large though lessening demand.

Cleveland

Oct. 23—The movement of iron ore is keeping up better than was expected, and it looks like fair shipments in October.

Finished Material—Business has been rather quiet. Prices are irregular. Bars are being taken rather freely. It is said that plates have been sold as low as 1.10c., Pittsburg base.

Pig Iron—Sales are rather slow and not many new inquiries have been received. Prices are unchanged. Bessemer iron could be had at a lower price, it is said, but no sales are reported.

Philadelphia

Oct. 25—The possible reduction in the cost of ore is giving some interest to the market. The chief interest centers in large transactions in pipe iron for delivery to the end of the year and in some cases to the end of the first quarter of next year. All makers in this territory are holding firmly to last week's quotations. Southern makers have placed considerable iron in this territory and in New England. Steel irons are much more inquired for, but the whole situation is disappointing in view of the sharp reductions which have been brought about. This hesitancy to order for next year's delivery is accentuated by the uncertainty as to cost of ore and freight. Stocks at furnaces are declining. Basic is quoted at \$14.50. Business is done in low phosphorus at \$20. There is a larger movement in gray forge than for some weeks, but it is limited to immediate needs. No. 2 X foundry is selling at \$15, and best Southern makes are bringing that price.

Steel Billets—Steel billets are quoted at \$21.40 for openhearth and all users report shops well filled with work.

Bars—Bars are somewhat more active as a result of some active ordering in connection with car-building work. The present business is confined mostly to small lots.

Sheets—As a result of long drawn out negotiations between mill men and large users of sheets quite a bulk of business has been closed, some deliveries extending far into next year. This business was taken at the lowest quotations.

Pipes and Tubes—A large business has been done by the cast-pipe makers. Merchant pipe is stronger and the week's business showed a marked increase.

Plates—Plates are exceptionally active, and a large business has been done. Buyers have had the advantage and they have taken hold freely, contracting in several instances for deliveries up to the end of March. Shipyard and boatyard work is quite an item. Engineering construction work has also figured strongly. Local orders foot up heavily, including an immense order for municipal work.

Structural Material—A large amount of business has been done in structural material for delivery at various points throughout the New England and Middle States, a large portion of which is for New York City.

Scrap—Scrap is again more active, but purchases are confined largely to railroad and No. 1 yard scrap for immediate delivery. Scrap has been weak for some time and the supply is a little in excess of demand.

Pittsburg

Oct. 24—The iron and steel market is not likely to be seriously affected by the developments in connection with the Hill lease, but the news has a slightly depressing effect, and the further news that the Minnesota ore rates are to be reduced from 80c. and \$1 to the uniform rate of 60c., is another sign that the iron trade is passing into a period of economies and cost paring. Developments in the market itself in the last week have not been important. Some finished-steel products have shown decreased buying and specifying, while others have shown slight increases, the net result being a moderate decrease. Bookings thus far this month, however, show little, if any, decrease from the corresponding period of September.

Prices continue under fire. Concessions of 5c. a keg in nails, given in a few instances, have developed into a general cut of this amount by at least two important interests, and the nail market is now fairly quotable at \$1.60. Plain wire, however, remains at 1.45c., so that the old-time spread of 15c. is restored. The fall buying movement in wire was a disappointment, and several of the mills will carry large stocks into the new year.

Pig Iron—A Shenango Valley furnace interest has sold several lots of malleable iron in the past week, totaling more than 5000 tons, at concessions from the previous market. The bulk of the material, graded as ordinary malleable, brought \$12.50, Valley, while some small lots, special in analysis, brought higher prices, up to \$13.25, Valley, for malleable high in both manganese and silicon. A sale of 500 tons of foundry iron was made last week at \$13.25, Valley, the open market having been \$13.50, but made only on small lots. The \$13.25 price could probably be done again on similar tonnages. Bessemer and basic have been very quiet. We quote: Bessemer, \$14.50; basic, \$12.50; malleable,

\$12.50; No. 2 foundry, \$13.25@13.50; forge, \$12.75@13, all at Valley furnaces, 90c. higher delivered Pittsburg.

Ferromanganese—A sale of one carload of ferromanganese has been made to a Canton, Ohio, interest, at \$39.50, delivered, equal to \$37.08, f.o.b. Baltimore, and we quote the market for prompt lots at \$37@37.25, Baltimore, freight to Pittsburg being \$1.95. The forward market is in doubt. The English combination weeks ago set a price of \$38.50, Baltimore, but this figure has been continually undersold, presumably with German material. In the old days the German ferromanganese sold only at a discount of \$1 a ton or more, but of late the Germans are reported to have so improved the analysis as to make the product command even terms with the English, among consumers familiar with the improvement. It is stated today that the English combination has succeeded in making a tentative arrangement with the German producers and that ultimately it will be possible to make its prices effective in the market.

Steel—The market has been uneventful since the October settlements on sheet-bar contracts, as no open-market sales of consequence have been made in billets or sheet bars. Another interesting period is expected when November sheet-bar deliveries come to be arranged for. We quote bessemer sheet bars at \$21, delivered Pittsburg or Youngstown, and bessemer billets at \$20, f.o.b. maker's mill, Pittsburg or Youngstown, with openhearth material at \$19 for billets and \$20 for sheet bars, Pittsburg. Rods are \$26, Pittsburg, with no sales of consequence being effected.

Sheets—The sheet market continues very irregular on account of so many mills quoting on a basis of maker's mill, instead of a Pittsburg basis, while sometimes a compromise is effected by the mill splitting the difference between its own freight and the Pittsburg rate to point of delivery. Roundly we quote the market at 1.80@1.85c. for black, 2.85@2.90c. for galvanized and 1.40c. for blue annealed, Pittsburg, it being understood that the lower prices could not be done for actual Pittsburg delivery. Nominal prices on corrugated roofing are \$1.40 for painted and \$2.55 for galvanized, Pittsburg, these prices being shaded from \$2 to \$4 a ton.

Iron Ore Trade

Prices of New York, New Jersey and other local ores to eastern furnaces at present are from 5¼ to 6¼c. per unit of iron at mines—7¼ to 7¾c. per unit delivered—which is about on a parity with Newfoundland ore at Philadelphia, and a little below Spanish ore. Swedish ore imports are mainly under contract. The imports of Cuban ore are nearly all taken by the steel companies which control the Cuban mines.

FOREIGN IRON TRADE

Swedish Iron Trade—Iron and steel production in Sweden, half-year ended June 30, in metric tons:

	1910	1911	Changes
Pig iron.....	306,100	338,600	I. 32,500
Puddled blooms.....	72,900	70,500	D. 2,400
Converter steel.....	52,400	42,500	D. 9,900
Open-hearth steel.....	179,200	183,500	I. 4,300

Exports for the half-year were: Pig iron, castings and scrap, 63,300 tons; blooms and billets, 27,800; bars, 62,700; other finished iron and steel, 26,500; total, 180,300 tons.

British Foreign Trade—Exports and imports of iron and steel, and of machinery, in Great Britain, eight months ended Aug. 31, as valued by the Board of Trade returns:

	Exports	Imports	Excess
Iron and steel	\$28,605,040	\$7,369,764	Ex. \$21,235,276
Machinery...	20,117,462	3,984,669	Ex. 16,432,793
Cutlery and hardware...	6,533,301	4,194,885	Ex. 2,338,416
New ships....	3,703,481	.....	Ex. 3,703,481
Total.....	\$59,259,284	\$15,549,313	Ex. \$43,709,966
Total, 1910..	61,119,703	12,562,365	Ex. 48,557,338

Decrease in exports, £1,860,419, or 3 per cent.; increase in imports, £2,986,953, or 23.8 per cent. The quantities of iron and steel were, in long tons:

	1910	1911	Changes
Exports.....	3,063,662	2,937,393	D. 116,251
Imports.....	859,793	1,168,164	I. 308,379

The greater part of the tonnage increase in imports was in blooms, billets, slabs and tinplate bars. The decrease in export values was mainly in new ships.

German Iron Production—The German Iron and Steel Union reports the make of pig iron in the German Empire in August at 1,285,942 tons, being 4164 tons less than in July. For the eight months ended Aug. 31 the totals were, in metric tons:

	1910	1911	Changes
Foundry iron....	1,901,450	2,027,748	I. 126,298
Forge iron.....	435,878	364,683	D. 71,195
Steel pig.....	885,915	1,152,784	I. 266,869
Bessemer pig....	326,579	234,726	D. 91,853
Thomas(basic)pig	6,143,330	6,478,746	I. 335,416
Total.....	9,693,152	10,258,687	I. 565,535

Total increase this year, 5.8 per cent. Steel pig includes spiegeleisen, ferromanganese and all similar alloys.

French Foreign Trade—Imports and exports of iron and steel in France, six months ended June 30, metric tons:

	Imports	Exports	Excess
Pig iron.....	138,532	56,614	Imp. 81,918
Steel Ingots, etc..	35,210	122,886	Exp. 87,676
Finished steel....	55,604	130,486	Exp. 74,882
Total.....	229,346	309,986	Exp. 80,640
Total, 1910.....	203,654	296,969	Exp. 93,315

Steel ingots include blooms, billets, wire rods and other half-finished material.

Pig Iron in Russia—Pig iron production in Russia for the year 1910, according to official reports: Foundry iron, 382,063; steel pig, 1,921,620; special irons, 97,133; unclassified, 639,230; total, 3,040,046 metric tons, an increase of 168,714 tons over the previous year.

METAL MARKETS

New York, Oct. 18—The metal markets have shown some changes both in demand and prices, but no material improvement has been manifest. Spelter remains especially strong.

B. Hochschild, long vice-president, has been chosen president of the American Metal Company, Ltd., of New York, in place of J. Langeloth, who becomes chairman of the board of directors, and will continue to take an active interest in the business.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT			
Metal	Exports	Imports	Excess
Gold:			
Sept. 1911..	\$2,352,861	\$ 4,704,096	Imp. \$ 2,351,235
" 1910..	1,822,476	3,192,341	Exp. 1,269,865
Year 1911..	18,263,310	45,177,106	Imp. 26,913,796
" 1910..	55,318,081	45,682,127	Exp. 9,635,954
Silver:			
Sept. 1911..	4,941,391	4,161,706	Exp. 779,685
" 1910..	4,830,346	3,441,494	Exp. 1,388,852
Year 1911..	49,528,961	33,696,430	Exp. 15,832,531
" 1910..	41,764,743	33,257,264	Exp. 8,507,479

Exports from the port of New York, week ended Oct. 22: Gold, \$225,281, chiefly to the West Indies; silver, \$1,233,442, principally to London. Imports: Gold, \$325,019; silver, \$108,364, mostly from Mexico and the West Indies.

Gold—Prices of gold on the open market in London were unchanged at 77s. 9d. per oz. for bars and 76s. 4d. per oz. for American coin. Paris took a large part of the supplies arriving on the market. There is some talk of gold exports from New York.

Gold production in the Transvaal, in the nine months ended Sept. 30, reached a total of \$126,075,466; an increase of \$10,414,641, or 9 per cent., over the corresponding period last year.

Iridium—Prices are unchanged, at \$65 per oz. for pure metal.

Platinum—The market remains firm, but with no change in prices. Dealers ask \$46@46.50 per oz. for refined platinum and \$48.50@49 for hard metal. The market abroad is strong; a recent London quotation is 185@186s. per oz., equal to \$44.96@45.20, for refined platinum.

Our Russian correspondent writes, under date of Oct. 12, that the market is strong and prices are advancing. A further increase is expected, as cold weather has set in early and will hinder the operation of mines in the Ural. At Ekaterinburg 10.05 kopeks per zolotnik—\$37.79 per oz.—is quoted for small lots of crude metal, 83 per cent. platinum. At St. Petersburg quotations are 38,500@38,750 rubles per pood—average \$37.83 per oz.—for the same grade.

Silver—Conditions in China have produced a speculative situation, and have induced India Bazaar buying, based on the uncertainty of affairs in that Empire, so that the market has had quite

an advance, and the tendency is uncertain.

SILVER AND STERLING EXCHANGE						
Oct.	19	20	21	23	24	25
New York....	54	54 1/2	54 1/2	54	54 1/2	54 1/2
London	24 3/4	25 1/8	24 1/2	24 3/4	24 1/2	25 1/2
Sterling Ex..	4.8660	4.8680	4.8680	4.8685	4.8680	4.8685

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

Shipments of silver from London to the East, Jan. 1 to Oct. 12, reported by Messrs. Pixley & Abell:

	1910	1911	Changes
India.....	£5,282,000	£6,628,800	I. £1,346,800
China.....	1,133,500	989,700	D. 143,800
Total.....	£6,415,500	£7,618,500	I. £1,203,000

India Council bills in London brought an average for the week of 16.09d. per rupee.

Copper, Tin, Lead and Zinc

NEW YORK							
Oct.	Copper		Tin	Lead		Zinc	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.
19	12 3/4 @12 1/2	12.20 @12.25	41 3/4	4.20 @4.12 1/2	4.10 @4.12 1/2	6.10 @6.25	5.95 @6.10
20	12 3/4 @12 1/2	12.20 @12.25	42	4.20 @4.25	4.10 @4.12 1/2	6.10 @6.25	5.95 @6.10
21	12 3/4 @12 1/2	12.25 @12.30	42 1/2	4.20 @4.25	4.10 @4.12 1/2	6.10 @6.25	5.95 @6.10
23	12 3/4 @12 1/2	12.25 @12.35	42 3/4	4.20 @4.25	4.10 @4.12 1/2	6.10 @6.25	5.95 @6.10
24	12 3/4 @12 1/2	12.25 @12.35	42	4.20 @4.25	4.10 @4.12 1/2	6.10 @6.25	5.95 @6.10
25	12 3/4 @12 1/2	12.25 @12.35	42	4.20 @4.25	4.10 @4.12 1/2	6.10 @6.25	5.95 @6.10

The New York quotations for electrolytic copper are for cakes, ingots and wire bars, and represent the bulk of the transactions made with consumers, basis New York, cash. The prices of casting copper and of electrolytic cathodes are usually 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

LONDON

Oct.	Copper			Tin		Lead, Spanish	Zinc, Ordinaries
	Spot	3 Mos	Best Sel'd	Spot	3 Mos		
19	55 1/4	56 1/4	59 3/4	189 3/4	189 3/4	15 3/4	27 3/4
20	55 3/4	56 3/4	60	191 3/4	191 3/4	15 3/4	27
21	.....	.....	.....	.....	.....	.....	.....
23	56	56 3/4	60	191 3/4	191 3/4	15 3/4	26 3/4
24	55 1/4	56 3/4	60	191 3/4	191 3/4	15 3/4	26 3/4
25	55 3/4	56 3/4	59 3/4	191 3/4	191	15 1/4	26 3/4

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 = 2.17 1/2 c.; £12 = 2.61 c.; £23 = 5c.; £60 = 13.40c. ± £1 = ± 0.21 3/4 c.

Copper—The improvement which was reported last week has made further progress, and under a large volume of business for both home trade and export prices for all grades advanced. The movement received a check on Tuesday, Oct. 24, when cables from London reported a lower market, and up to this writing the reaction in London had not run its course. The close is steady at 12 $\frac{3}{8}$ @12 $\frac{1}{2}$ c. for Lake copper, and 12.25@12.35c. for electrolytic copper in cakes, wirebars and ingots. Casting copper is quoted nominally at 12@12 $\frac{1}{4}$ cents.

After reaching £56 for spot and £56 15s. for three months on Oct. 23, the market weakened and closes in a rather unsettled state at £55 8s. 9d. for spot and £56 3s. 9d. for three months.

Copper sheets are 18@19c. base, for large lots. Full extras are charged and higher prices for small quantities. Copper wire is now 13 $\frac{1}{2}$ c. base, carload lots at mill. Business is quiet.

Exports of copper from New York for the week were 7067 long tons. Our special correspondent gives the exports from Baltimore at 3583 tons.

Tin—Fluctuations have been within narrow limits. The advance of the previous week is well maintained, and there has been a fair business doing in small lots. The large consumers have shown more interest, but in view of the decline in prices of their manufactured product, particularly tinplate, they are disinclined to commit themselves beyond covering their immediate wants. The market in London closes steady at £191 10s. for spot, and £191 for three months. October tin in this market is quoted at about 42 cents.

L. Vogelstein & Co., New York, write, under date of Oct. 23: "By a change in the rules and regulations of the London Metal Exchange made a week ago today and effective, as we understand it, on three months' contracts dated on and after Nov. 1, deliveries on contracts are not confined as heretofore to Straits and Australian brands. In the new contract seller has option to deliver

"Class A. (1) Straits or Australian tin of good merchantable quality at contract price. (2) Refined tin of good merchantable quality, assaying not less than 99.75 per cent., at contract price.

"Class B. Common tin in ingots or slabs of good merchantable quality, assaying not less than 99 per cent., subject to a rebate of £7 per ton from contract price."

Lead—The market is unchanged at 4.10@4.12 $\frac{1}{2}$ c., St. Louis, and 4.20@4.25c., New York.

The lead market in London is very firm. The scarcity which has been reported from time to time appears still to be in evidence, and prices show a sharp advance to £15 13s. 9d. for Spanish, and £15 16s. 3d. for English lead.

Spelter—There has been no change in the character of the market reported during recent weeks. Owing to the scarcity of prompt spelter, business is restricted, and there is very little buying for the future deliveries which smelters are offering at relatively very low prices. The close is steady at 5.95@6.10c., St. Louis, and 6.10@6.25c., New York.

The London quotation has declined to £26 5s. for good ordinaries and £26 10s. for specials, due to the action of the Syndicate, which is in entire control of the European spelter market.

Zinc dust is unchanged at 7 $\frac{1}{2}$ @7 $\frac{3}{4}$ c. per lb., New York.

Base price of zinc sheets is \$8 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

Zinc production in the Silesian district is reported at 77,506 metric tons in the first half of 1911; an increase of 7827 tons over 1910; zinc sheet make, 33,892 tons, an increase of 8810 tons; zinc dust, 2043 tons, an increase of 71 tons.

Imports and exports of zinc in Germany, eight months ended Aug. 31, metric tons:

	Imports		Exports	
	1910	1911	1910	1911
Spelter.....	26,425	32,121	50,900	49,209
Scrap.....	1,160	1,442	4,317	2,704
Sheets.....	125	328	14,363	26,212
Zinc dust.....	926	955	1,989	1,998
Zinc pigments.....	5,276	5,055	21,614	22,678

Imports of zinc ores were 161,812 tons in 1910 and 173,270 in 1911; exports 36,226 in 1910, and 35,827 tons this year.

Other Metals

Aluminum—A little better business is reported, but prices are unchanged. We quote 18 $\frac{1}{2}$ @19c. per lb. for No. 1 ingots, New York.

Exports of aluminum from Canada to Great Britain from November, 1910, to July, 1911, inclusive, were 1,290,300 lb. Exports to the United States in the same period were 812,800 lb., all of it in the months from March to July of this year.

Antimony—Business has been rather better and there has been more buying, but prices are weaker. Cookson's is quoted at 8@8.12 $\frac{1}{2}$ c. per lb., and Halllett's at 7.50@7.75c. Outside kinds are still offered at low prices, and we quote 6.75@7c. per lb. for Chinese, Hungarian and other brands.

Quicksilver—Business is fair 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.

Bismuth—The syndicate which controls the European production quotes 7s. 6d.—equal to \$1.80—per lb. in London. In New York a quotation of \$1.72 per lb. is made for metal produced from American ores.

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.

Cadmium—The last quotation was 700 @725 marks per 100 kg.—75.5@78.3c. per lb.—at works in Germany, according to quantity.

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

British Metal Imports and Exports

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

Metals:	Imports	Exports	Excess
Copper, long tons	99,747	51,386	Imp. 48,361
Copper, 1910....	85,743	54,093	Imp. 31,650
Tin, long tons....	28,609	29,685	Exp. 1,076
Tin, 1910.....	27,998	28,355	Exp. 357
Lead, long tons..	150,073	29,276	Imp. 120,797
Lead, 1910.....	145,090	32,502	Imp. 112,588
Spelter, 1 $\frac{1}{2}$ tons..	85,891	6,607	Imp. 79,284
Spelter, 1910....	83,739	5,889	Imp. 77,850
Quicksilver, lb..	3,219,665	1,833,404	Imp. 1,386,261
Quicksilver, '10	3,233,150	1,086,227	Imp. 2,146,923
Minor met's, tons	3,868	14,192	Exp. 10,324
Minor, 1910.....	3,491	15,511	Exp. 12,020
Ores:			
Tin ore and con.	19,782	.....	Imp. 19,782
Tin ore, 1910....	17,195	.....	Imp. 17,195
Pyrites.....	616,669	.....	Imp. 616,669
Pyrites, 1910....	538,661	.....	Imp. 538,661

Copper totals include metallic contents of ore and matte. Exports include re-exports 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 35,535 tons fine copper, and 29,691 tons lead. This lead was chiefly Mexican, refined in this country.

Zinc and Lead Ore Markets

Platteville, Wis., Oct. 21—The base price paid this week for 60 per cent. zinc ore was \$44@44.50. The base price paid for 80 per cent. lead ore was \$52 per ton.

SHIPMENTS, WEEK ENDED OCT. 21

Camps	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Mineral Point.....	614,720	.....	.....
Galena.....	579,700	.....	.....
Benton.....	558,300	80,390	168,000
Platteville.....	516,700	.....	336,800
Highland.....	417,700	.....	.....
Hazel Green.....	140,000	.....	.....
Shellsburg.....	86,000	.....	.....
Linden.....	.....	.....	60,000
Total.....	2,903,120	80,390	564,800
Year to date.....	122,724,889	7,393,875	24,697,800

Shipped during week to separating plants, 2,411,000 lb. zinc ore.

Joplin, Mo., Oct. 21—The high price for zinc sulphide ore was \$48, the base price of 60 per cent. zinc \$42@45. Zinc silicate sold on a base price per ton of 40 per cent zinc at \$24@25. The average price, all grades of zinc, was \$40.76. Lead sold as high as \$56 per ton, a considerable quantity, sold toward the week end, bringing this price, with offerings on next week's delivery at \$56@57. The average price all grades of lead, was \$53.20 per ton, lowered from last week by a sale of "dry bone."

The reorganized Zinc Producers' Association, comprising those who opposed contract selling of zinc ore, is creating local talk of exportation of zinc ore, a subject that has, perhaps, aided the advanced price of spelter, but has reacted but lightly upon the open market price of zinc ore. The result has been that those selling on the contract base have received the greater benefit of the higher price of metal.

are firmer, \$2.12½ @ 2.25 per 100 lb. being asked for white arsenic for early delivery.

Sulphur—Messrs. Parsons & Pettit, New York, report the importation by them as agents of the Sicilian sulphur industry, of 1,000 tons of Sicilian crude brimstone, arrived Oct. 18 at New York.

protective committee will now put through the reorganization and call for a \$3 assessment on the stock. The mine is idle, but the Eureka shaft is being kept free from water and the railroad is in operation.

Porcupine stocks continue the active

SHIPMENTS, WEEK ENDED OCT. 21

	Blende	Calamine	Lead Ore	Value
Webb City-Carterville	4,224,770	.....	728,110	\$108,742
Joplin	2,223,760	.....	313,730	54,075
Galena	633,060	.....	81,470	15,530
Alba-Neck	588,400	.....	.....	12,944
Duenweg	373,590	146,430	51,550	11,312
Miami	254,950	.....	174,100	9,120
Jackson	393,990	.....	.....	8,270
Carl Junction	355,090	.....	.....	8,165
Granby	161,750	325,470	12,800	7,600
Spurgeon	179,590	130,200	48,970	7,055
Quapaw	179,740	.....	.....	3,595
Oronogo	199,470	.....	.....	2,718
Lawton	64,080	.....	44,990	2,610
Cave Springs	118,480	.....	.....	2,605
Aurora	62,590	62,350	.....	2,285
Saginaw	.....	64,520	2,340	1,090
Badger	5,760	.....	16,330	565
Totals	10,019,070	728,970	1,474,390	\$258,281

42 weeks. 398,048,800 29,187,800 71,743,800 \$10,457,226
 Blende val., the week, \$208,750; 42 weeks, \$7,961,821
 Calamine, the week, 10,301; 42 weeks, 454,881
 Lead value, the week, 39,230; 42 weeks, \$2,040,524

MONTHLY AVERAGE PRICES

Month	ZINC ORE				LEAD ORE	
	Base Price		All Ores		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	.....	40.50	.....	53.18	.....
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.

CHEMICALS

New York, Oct. 25—The general market shows little variation from last week. Business in most lines is fair, but not especially active.

Copper Sulphate—On a moderate trade prices are steady and unchanged, at \$4.50 per 100 lb. for carload lots, and \$4.75 per 100 lb. for smaller parcels.

Nitrate of Soda—Business is reported good in this article and prices are firmer. Current quotations are 2.25c. per lb. for spot and for futures up to Dec. 31; and 2.22½c. for all positions next year.

Arsenic—Demand continues good and supplies are still rather limited. Prices

Petroleum

Exports of mineral oils from the United States nine months ended Sept. 30, in gallons:

	1910	1911
Crude petroleum	81,966,118	82,589,091
Naphthas	60,382,242	82,154,867
Illuminating oils	700,668,582	856,132,172
Lubricating and paraffin	120,042,702	130,175,107
Residuum	83,223,261	89,083,698

Total 1,046,282,905 1,240,134,935

Total increase this year was 193,852,030 gal., or 18.5 per cent.

MINING STOCKS

New York, Oct. 25—The general stock markets have shown a little more strength but no great activity. Price changes have been only fractional. The absence of active speculation is shown by the abundance of money, which has led to some transfers to foreign markets.

On the Curb copper stocks have been the most active feature in the mining list, and quite a large business was done in the more speculative stocks. In general, prices were held, or advanced; but the gains in most cases were of the fractional sort. Cobalt stocks were irregular on a rather narrow market. The Porcupine shares attracted some attention.

Boston, Oct. 24—Notwithstanding the reported large sales of copper, the market for these shares is exceedingly dull, although firm in tons. The public is doing nothing and price changes are largely the result of floor trading. Activity appears in spots, but within narrow limits. Greene-Cananea has been one of them, having risen \$1.37½ to \$7.12½ on talk of the resumption of dividend payments. Some of the cheaper stocks have inclined to heaviness through fear of the levying of assessments. Conspicuous is the decline in Algolah to a low record of \$2.50 per share. Precedent has been established by a \$1.50 assessment on Indiana shares a fortnight or so ago. Stocks like Calumet & Arizona, North Butte, Allouez, Copper Range, Utah Consolidated, Indiana, Inspiration, Lake and North Lake have shown the most activity and strength, although advances have been slight and not beyond \$2 for the week in any case.

A fire in the Old Dominion mine, which destroyed the Kingdon shaft, did not bring a share of the stock onto the market. The destruction of this shaft will not cause any falling off in the output as it was not being used for production. Arizona Commercial continues to be traded in between 25 and 50c. The

COPPER PRODUCTION REPORTS.

Copper contents of blister copper, in pounds.

Company	July	August	Sept.
Alaska shipments	4,678,637	2,095,690	.....
Anaconda	21,900,000	22,500,000	21,565,800
Arizona, Ltd.	2,750,000	2,720,000	2,544,000
Balakhala	.....	.....	.....
Copper Queen	6,373,062	7,006,097	6,546,540
Calumet & Ariz.	4,294,000	4,650,000	4,198,000
Detroit	1,590,357	2,080,100	1,864,050
East Butte	847,000	854,000	1,134,000
Mammoth	1,598,082	.....	.....
Nevada Con.	5,258,582	5,249,515	5,328,983
Old Dominion	2,114,000	1,982,000	2,032,000
Shannon	1,150,000	1,442,560	1,650,080
South Utah	254,462	269,546	.....
United Verde*	3,000,000	2,500,000	.....
Utah Copper Co.	7,555,407	9,010,669	9,285,381
Lake Superior*	17,000,000	19,000,000	18,500,000
Non-rep. mines*	16,800,000	.....	.....
Total production	97,263,589	.....	.....
Imports, bars, etc.	20,999,078	22,798,151	.....
Total blister	118,262,667	.....	.....
Imp. in ore & matte	4,205,940	9,821,942	.....
Total	122,568,607	.....	.....
Brit. Col. Cos.	.....	.....	.....
British Col. Copper	854,122	.....	.....
Granby	1,228,846	.....	.....
Mexican Cos.	.....	.....	.....
Boleo	1,973,680	2,149,028	2,094,400
Cananea	3,994,000	.....	.....
Moctezuma	2,340,404	2,263,707	2,112,683
Other Foreign:	.....	.....	.....
Cape Cop., S. Africa	.....	.....	.....
Spassky, Russia	672,000	649,600	.....
Exports from:	.....	.....	.....
Chile	7,168,000	4,032,000	.....
Australia	7,056,000	7,392,000	.....

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
IX, 1910	119,519,983	64,501,018	75,106,496
X	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	130,632,080	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	59,936,364	69,855,660
IX	115,588,950	57,311,584	50,824,011

VISIBLE STOCKS.

	United States.	Europe.	Total.
X, 1910	148,793,714	211,276,800	360,070,514
XI	139,261,914	198,060,800	337,322,714
XII	130,389,069	193,200,000	323,589,069
I, 1911	122,030,195	236,629,120	358,659,315
II	142,439,490	236,992,000	379,431,490
III	156,637,770	233,385,600	390,023,370
IV	162,007,934	223,014,400	385,022,334
V	165,555,908	212,254,800	377,810,708
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

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.

Curb features, especially Porcupine Northern and Porcupine Southern. A big element of manipulation, however, enters into the trading in these securities. Goldfield Consolidated, after a drop to \$3.75, has shown some recovery.

Assessments

Table with columns: Company, Delinq, Sale, Amt. Lists various companies like Andes, Nev., and their assessment details.

Monthly Average Prices of Metals

SILVER

Table showing monthly average prices for silver in New York and London from 1909 to 1911.

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

COPPER

Table showing monthly average prices for copper in New York and London from 1910 to 1911.

New York, cents per pound, London, pounds sterling per long ton of standard copper.

TIN AT NEW YORK

Table showing monthly average prices for tin in New York from 1910 to 1911.

Prices are in cents per pound.

LEAD

Table showing monthly average prices for lead in New York, St. Louis, and London from 1910 to 1911.

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Table showing monthly average prices for spelter in New York, St. Louis, and London from 1910 to 1911.

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PIG IRON AT PITTSBURG

Table showing monthly average prices for pig iron at Pittsburgh in Bessemer, Basic, and No. 2 Foundry from 1910 to 1911.

STOCK QUOTATIONS

Table listing stock quotations for Colorado Springs and Salt Lake, including company names and bid prices.

TORONTO

Table listing stock quotations for Toronto, including company names and bid prices.

SAN FRANCISCO

Oct. 24

Table listing stock quotations for San Francisco, including company names and bid prices.

N. Y. EXCH.

Oct. 24

Table listing stock quotations for New York Exchange, including company names and bid prices.

N. Y. CURB

Oct. 24

Table listing stock quotations for New York Curb, including company names and bid prices.

BOSTON EXCH.

Oct. 24

Table listing stock quotations for Boston Exchange, including company names and bid prices.