Issued Weekly by the
Hill Publishing Company
JOHN A. HILL, Pres. ROB'T MCKEAN, Secy.
505 Pearl St., New York.

Monadnock Bldg., Chicago.
6 Bouverie Street, London, E. C.
Unter den Linden 31—Berlin N. W. 7.

WALTER RENTON INGALLS, Editor.

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, Engmnjour, N. Y.

CIRCULATION STATEMENT

Of this issue 9000 copies are printed.

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

Contents

The Engineering and Mining Journal

Vol. 94 NOVEMBER 30, 1912 No. 22

Problems of the Petroleum Industry in California

The petroleum industry in California is relatively young, but we believe that we are correct in the opinion that it has been developed upon a more scientific basis than in any of the older fields of the United States. The engineering literature of the subject is one evidence of this. Pennsylvania, Ohio, Illinois, Kansas, Oklahoma, etc., have given us but little; California has given us a good deal. The reasons for this difference are to be found, no doubt, in the greater cost of prospecting for oil in California, where the wells are relatively deep, necessitating a large original outlay of capital; and the interest that has been taken in the industry by engineers experienced in gold, silver and copper mining, who have applied to petroleum production the principles that made them successful in their other work. Of course the California petroleum producers, like all others, have had their problems. Some of them that remain unsettled are very serious. But with customary California thoroughness, they are being considered in a scientific way. The latest manifestation of this is a report on the "Fuel Resources of California" by Messrs. M. L. Requa (chairman), F. W. Bradley and Walter Stadler, as a committee of the Commonwealth Club of San Francisco. This report, which is a pamphlet of 36 pp., is a very good treatise on petroleum production.

This committee finds the things especially menacing the petroleum industry of California to be the following, stated in the order of their relative importance: (1) Influx of water into the oil formation; (2) competitive drilling whereby one company offsets the wells of its neighbor; (3) unsatisfactory control of production by the marketing companies, permitting the production of unnecessary quantities of oil, with consequent loss through evaporation and seepage; (4) the undetermined disposition of government land. The committee recommends that the water danger be minimized by the establishments of commissions, supported by a fund of $500,000 raised by a special tax per barrel of oil produced, this fund to be placed in the hands of the State Mining Bureau and to be distributed among the various fields in proportion to their production, boards of commissioners to be elected in each field by the companies operating therein, one vote being given for each acre of land owned, these boards to elect water supervisors to carry out the existing law.

Line drilling is a recognized waste in oil production. In the words of the committee, "Line drilling, frankly, is done to get something belonging to someone else, on the theory that if not done, it will be done by the other company." If a company drills in the corner of four adjoining pieces of land, the other three corners must be drilled or their owners will lose a certain quantity of their oil. The result is four wells, three of them forced by the drilling of the first one. The committee recommends that this practice be abolished and drilling from the center of each piece of property be substituted by agreement among the property owners. The committee points out that it would be to the advantage of a company to drill from the center outward, inasmuch as the cost of operation would be materially decreased by having the wells as near as possible to a central operating plant, while the pipe lines would be of the minimum length and transportation from and to the warehouse would be minimized. The total quantity of oil extracted would ultimately be the same, with the added benefits that owners would cease drilling when the price of oil be low, without fear of having their territory drained. The committee proposes that this be accomplished by agreement, but suggests that possibly legislation can be enacted that would render such a method of drilling obligatory.

No doubt, legislation to control the water in the oil strata and to prevent line drilling would be constitutional under the state's police power. It may be argued that this would be an interference with the rights of property, but the owner of a piece of real estate is not permitted to reach over his fence and steal goods from his neighbor's property. No more should he be permitted to steal his neighbor's oil. In the latter case the difficulty is, of course, in proving the theft. The conditions of oil occurrence being as they are, it would, we think, be within the right of a state to compel owners of property to behave in such a way that they could not steal their neighbor's oil, intentionally or unintentionally.

With respect to the control of production and market conditions, the committee is pessimistic. It says: "So far as the Sherman law is concerned, or so far as any of the recent efforts at trust regulation is concerned, there have been absolutely no benefits derived for the oil producers. On the contrary, conditions have been made worse. Under existing conditions, there is no possibility of getting the marketing companies together to agree upon any uniform policy." The committee thinks that this ought to be permitted, but does not see how it can legally be done.

The withdrawal of the government land is fully approved, there being no present need for its oil. When the oil is required it will no doubt be released, probably by a leasing system. "If such a leasing system is inaugurated," says the committee, "it should be as free and unhampered by government control as possible." With this opinion we concur.

Mining Accidents in Tasmania

Under the rigid system of mine inspection that is practiced in Tasmania, the fatality rate in mining in that state has been steadily diminishing. In the period 1893-97, it was 1.527 per thousand; in 1898-1902 it was 1.411; in 1903-07 it was 1.088; and in 1908-11 it was 0.935. In 1911 alone it was only 0.762, only four men having been killed out of an average of 5247 employed during the year in the mines and smelting works of the state. Of course, the rate for 1912 will be enormously increased by the sad catastrophe that happened last month in the North Mt. Lyell mine.

Notwithstanding that, the record of the mines-inspection department of Tasmania is one to be proud of, and without doubt the accidents, both fatal and non-fatal, in mining "can be restricted and reduced," in the words of the chief inspector, "If those who control and operate the industry—government, owners and workmen alike—will unite in aiming at total prevention." Such a union of effort is certainly necessary.

It may be pointed out that under the enlightened legislation of Tasmania and the sincere and impartial execution of its laws, responsibility is fixed on the miners, as well as on the operators. If a miner disobeys the law of the state he is subject to proceedings inaugurated by his fellow employees, superintendent or any one of the state inspectors, and if found guilty is fined or otherwise punished. This is an important way to reduce accidents in mining, to reduce the number of widows and orphans, to reduce industrial charges, etc., but if this were proposed in the United States, what would the Western Federation of Miners say about it?

The Future of Slime Cyanidation

Irrespective of the recent legal decision about the slime filters, because after all it is not of great consequence to the cyanide operator whether he pay a royalty to one patentee or another (assuming the royalty always to be moderate), the earnestness with which cyanide operators, during recent years, have been seeking to avoid the use of slime filters at all, is noteworthy. In the early days of slime treatment two distinct practices, filtration and decantation, were inaugurated. The system of filtration introduced by Moore and his imitators, and the system later introduced by Merrill, proved economically superior to the decantation process, which soon was abandoned.

Yet there has always been a feeling that the filtration systems, which are of relatively high cost both for installation and operation, do not attain the acme of efficiency, and there has been a lurking suspicion that perhaps the old method of decantation might be capable of improvement. The trend of opinion among cyanide operators seems to be more and more in this direction.

One of the developments toward this end is the attempt to treat slime by the continuous decantation method, by means of which a number of changes of solution is possible. Successive thickenings and dilutions tend toward rapid solution of metals, and the avoidance of filters is hoped for by making each dilution with weaker solution, using a final extremely weak, barren solution, or water.

Where water is not scarce and weak solution can be used, as is the case of some gold ores, the system may be used without the aid of any filter at all, as successive dilutions will reduce the metal and cyanide content so that there is little loss in discarding the necessary amount which must go out as contained moisture. Where water is scarce and stronger solutions must be used, as in beneficiating silver ores, some method of recovering the greater part of the final moisture content must be found. Thickeners can be relied upon to deliver a product containing approximately 50% moisture, sometimes a little less, and some one of the simpler forms of filters, which are really not filters at all, but dewatering machines, will easily reduce the moisture content one-half.

The decantation method, or some variation of it, is being tried in several mills in different localities and some successful evolution is to be expected.

We have received from the U. S. Geological Survey some interesting pamphlets treating statistically and industrially of copper, lead and spelter in 1911. Why the U. S. Geological Survey should go into these matters is "what no fellow can find out," as Lord Dundreary used to say. There might be more excuse for them under the Bureau of Mines, which anyway is manifestly where the Division of Mineral Statistics belongs.

The custom furnaces—that is, those making pig iron for sale in that form—apparently have to face higher costs for next year. Already prices of iron ore have been advanced and other increases are promised. Ore charges will be from 15 to 20% higher than this season both for Lake Superior and Eastern ores; while the supply of foreign ores will be largely cut off by high freight rates. A more important item, however, will be in the cost of coke, which is now bringing $3.75 or $4 per ton, nearly twice as much as a year ago.

By the Way

The Ekaterinoslaff school has been made a superior educational establishment, which, like the St. Petersburg Mining School, will have full rights to confer the degree of mining engineer. Thus in Russia, says a correspondent of the *Mining Journal*, there will be three mining schools—one in St. Petersburg, one in Ekaterinoslaff (Donetz mining district), and one in Ekaterinburg (Ural district).

The last quarterly report of the Utah Copper Co. states that the production was 29,966,920 lb. of copper from 1,581,527 tons of ore, which amounts to a yield of 18.967 lb. of copper per ton of ore, or 0.9484% Cu. The tenor of the ore is given at 1.41%, which indicates a recovery of 67%. Nevada Consolidated recovered 18,405,467 lb. of copper from 797,794 tons of 1.74% ore, a recovery of 68.2%. Chino recovered 10,340,960 lb. of copper from 340,300 tons of 2.33% ore, or an extraction of 65.15%. Chino's report stated that in July the recovery was 74.84%, indicating a recovery in August and September of 61.36%. Ray reported a production for the second quarter of 8,952.074 lb. of copper from 374,609 tons of 1.72% ore, or a recovery of 69.37%, as against 68.85% for the first quarter.

The field work of the International Geological Survey along the 141st meridian—the Alaska-Yukon boundary line—from the Yukon River to the Arctic Ocean, has been practically completed. It was divided between the United States and the Canadian geological surveys. The work was commenced in the spring of 1911, and by the terms of the agreement, the United States and Canadian geologists worked to the north and south respectively of Porcupine River. This work not only gives a geological section at that longitude through the northern half of the Yukon Plateau, the entire Rocky Mountain, and the Arctic Slope physiographic provinces, but should also assist materially in correlating the geology of Alaska with that of Yukon and British Columbia.

The officers of the Hardinge Conical Mill Co. are smiling about a case of its well known and useful mill, designed only for peaceful industrial purposes, being mistaken for an engine of warfare. A recent shipment of one of these mills with its full complement of steel balls was confiscated by *insurrectos* in Mexico upon the supposition that it was some new Yankee implement of war. The mistake was evidently the result of the mill being of unusual shape, and accompanied by two tons of steel balls. The description of the hold-up and the unsuccessful efforts of the rebels to make use of their capture would make a good story if garnished with all its details. The Mexicans were willing to accept the fact that *gringo* ingenuity was responsible for some sort of trouble exterminator, but efforts to make proper use of the capture only resulted in their sidetracking the car and the placing of a guard over the unrecognized device. One thing, however, they were sure of, viz., that the balls resembled certain munitions of war with which they were acquainted. Since the first report of the detention, the *maquina infernal* has been placed and is peacefully pounding out gold, which latter we admit is the "root of all evil."

A new form of mining swindle is reported. In this instance, however, the mining company is swindled, and not the people. The federal authorities recently raided the brokerage offices of Hunter & Crane in various cities. One of the complaints was from a mining company which declared that it had been swindled out of $8500. A Pittsburgh mining company told the federal authorities that it advertised its bonds for sale and received a reply from Hunter & Crane, who suggested that it would be an easy matter to market the bonds if they were guaranteed. Then the company received a communication from a Rochester bonding company which was to guarantee the underwriting of the bonds. The bonding company obtained $5000 for underwriting $500,000 worth of bonds. The next development was the opening of negotiations by a London company for the handling of the bonds, and in order that an engineer sent supposedly by a possible purchaser might be suitably entertained, the Pittsburgh mining company parted with $3500 more. Later the company was informed that the engineer had made an adverse report. In time the company became convinced that it was being swindled and complained to the federal authorities.

Now and then we are let behind the scenes in the theater of great market movements and this always is interesting. One of the oldest and most highly esteemed of the brokerage houses trading in gold and silver in London is Samuel Montagu & Co., a former head of which was raised to the peerage as Lord Swaythling. A member of the firm also sits in Parliament. Recently his right to his seat was questioned because of participation in government contracts. The present Lord Swaythling, speaking in the House of Lords on Nov. 14, replied to the criticisms of the action of the India Office for employing his firm, Messrs, Samuel Montagu & Co., to purchase silver for the Indian Government. He said it was common knowledge that a ring was formed some time ago in India for the purpose of rigging the market in India against the Indian Government. There are only four firms that deal largely in silver in London, and three of those were acting at the time for that ring. His firm was the only exception. In the instructions given to it secrecy was made one of the chief objects in order to avoid the possible or certain rise which would occur in the market. It was informed that after the reasons for secrecy ceased to exist the India Council would probably go back to its own channels of purchase. The firm acted on the instructions of the Finance Committee, who told it sometimes to abstain from and sometimes to resume purchases. No inkling of the purchases crept out until the first shipment of silver had arrived in India. The firm was complimented by the India banks on the way in which the secrets of the India Council had been kept, and received a letter of thanks from the India Council. The House could imagine the surprise and disappointment caused to his firm by the attacks made upon it in the public press, chiefly through lack of information. He could only imagine that some of the attacks which had been made on the firm and on the Government of India had been instigated by speculators in India who, having carried their silver holdings for many months, losing interest thereon, were balked of the huge profits, not confined to the £99,000 mentioned in the House of Commons, but of the far larger sum which they expected to make from the India Council.

A course of instruction in mining has been inaugurated at the Haileybury (Ont.) high school, the first classes being opened Oct. 23. Charles Speerman, a graduate of Queens and Columbia Universities, has been appointed instructor. According to Principal W. A. Wilson, the idea is to offer: (A) Instruction to actual employees of the Cobalt district; (B) instruction to high-school pupils in elementary mining studies for the purpose of interesting them in obtaining higher education at some university; and (C) to give the youth of the district who are unable to attend college an opportunity of acquiring such technical education as will fit them to engage in an intelligent and useful manner in the chief industry of the district. The instruction to employees includes: (1) short courses; (2) night courses; (3) lecture courses; (4) correspondence courses; (5) field courses for prospectors. The principal features will occur in a single year of the high-school course, and will include the subjects of machinery, mining methods, design of mine and mill equipment, surveying, metallurgy, mining geology, petrography, assaying and business methods and administration. This is a rather large order for high-school pupils to masticate; indeed some universities have failed to convey a comprehensive idea of these subjects to their students in four years. If, however, the high-school course stimulates enough interest to induce the pupils of that district to attend a qualified university, it may serve its purpose.

Selling Prices of Lake Iron Ores

Although the settlement of rates on Lake Superior iron ore is not quite as important an event as it was 10 or 15 years ago, owing to the large proportion of ore now mined by steel companies for their own use, it is still of much interest to the smaller independents and the merchant furnaces which buy their ore. Nominally—for reasons easily understood—there is no open agreement, but the prices charged by all sellers are practically the same. This year the rates were adopted and sales of ore began with apparently little previous conference and at an unusually early date. The base for prices is the same as for several years past, 55% iron and under 0.45% phosphorus for bessemer ore; 51.5% iron for non-bessemers. On these bases the prices for 1913 are equivalent to 8c. per unit of iron for Old Range and 7.56c. per unit for Mesabi bessemers; 7c. per unit for Old Range and 6.6c. for Mesabi non-bessemers. The prices given are delivered on Lake Erie docks, and for delivery at furnace freight charges varying from $0.75 up, according to distance, must be added to get the cost at furnace.

SELLING PRICES OF LAKE IRON ORE FOR 24 YEARS

Season	Date buying movement	Season Iron Ore Prices				Iron Prices, Valley	
		Old Range bessemer	Mesabi bessemer	Old Range non-bessemer	Mesabi non-bessemer	Bessemer	Foundry No. 2
1890	Dec. 15, 1889	$5.50	no sale	$5.25	no sale	$22.15	$18.15
1891	June 1, 1891	4.50	no sale	4.25	no sale	15.15	15.00
1892	Jan. 31, 1892	4.50	no sale	4.25	no sale	15.00	13.65
1893	Mar. 15, 1893	3.85	$3.00	3.20	no sale	12.65	12.15
1894	Mar. 1, 1894	2.75	2.35	2.50	no sale	9.65	9.65
1895	Apr. 1, 1895	2.90	2.15	2.25	$1.90	9.40	9.40
1896	May 1, 1896	4.00	3.50	2.70	2.25	12.40	11.15
1897	May 20 1897	2.60	2.25	2.15	1.90	8.35	8.40
1898	Mar. 20, 1898	2.75	2.25	1.85	1.[illegible]	9.55	9.80
1899	Feb. 1, 1899	3.00	2.40	2.15	2.00	10.30	9.75
1900	Dec. 15, 1899	5.50	4.50	4.25	4.00	24.15	22.15
1901	Apr. 15, 1901	4.25	3.25	3.00	2.75	16.15	14.40
1902	Feb. 1, 1902	4.25	3.25	3.25	2.75	15.90	15.00
1903	Mar. 20, 1903	4.50	4.00	3.60	3.20	21.50	21.65
1904	Apr. 15, 1904	3.25	3.00	2.75	2.50	13.35	13.15
1905	Feb. 1, 1905	3.75	3.50	3.20	3.00	15.50	16.00
1906	Dec. 5, 1905	4.25	4.00	3.70	3.50	17.25	17.25
1907	Nov. 10, 1906	5.00	4.75	4.20	4.00	21.50	21.50
1908	June 15, 1908	4.50	4.25	3.70	3.50	16.00	15.00
1909	May 10, 1909	4.50	4.25	3.70	3.50	14.75	14.25
1910	Dec. 24, 1909	5.00	4.75	4.20	4.00	19.00	17.25
1911	Apr. 21, 1911	4.50	4.25	3.70	3.50	15.00	13.75
1912	Mar. 20, 1912	3.75	3.50	3.00	2.85	14.25	13.25
1913	Nov. 19, 1912	4.40	4.15	3.60	3.40	17.25	17.50

We are indebted to the *Iron Trade Review* for the interesting table given herewith, which shows the prices for 24 years, the dates when buying opened and the prices for bessemer pig and No. 2 foundry iron in the Mahoning and Shenango valleys at those dates:

It will be seen that the date of first sales this year was earlier than in any other of the 24 except in 1907. The latest date reported was in 1908, when sales did not begin until June 15 of the same year. In only five out of the 24 years were sales opened before Jan. 1. The total quantity of ore sold up to date is reported at about 6,000,000 tons.

The changes from 1912 for the coming season are increases of 65c. per ton on bessemer ores; of 60c. on Old Range, and 55c. on Mesabi non-bessemers. The rates are nominally 10c. per ton below those of 1911; but there has been a cut of 20c. on rates from the mines to Lake Superior ports and of 5c. on unloading charges, so that there is really a difference of 15c. in favor of the ore sellers this year. To offset this, it is claimed that vessel rates will be higher, as well as wages at the mines; but this remains to be settled later.

Potash in Nebraska

Many shallow lakes, 50 to 500 acres in extent, occupy depressions among the sand hills of western Nebraska. At the ordinary stage of water, most of the lakes have no surface outlets. Some of them are apparently underlaid by impervious measures, which prevent the escape of the water by seepage. As a result they form a shallow evaporating pan in which large quantities of the saline materials of the tributary drainage waters accumulate and become concentrated. One of the largest of these bodies of water, covering about 400 acres, known as Jesse Lake, was visited by Mr. Dole, of the U. S. Geological Survey.

It varies in depth from 30 in. to dryness, according to rainfall and the season. When the lake was examined in May, a strip of the lake shore about 100 ft. wide was exposed and the water in the lake was about a foot deep. The shore is a brownish-black sticky mud devoid of vegetation. The lake is entirely surrounded by typical sand hills and probably it would be necessary to have a rise of four or five feet in the water level to effect surface run-off. Samples of water from the lake go from 2.9 to 3.34 grams of soluble salts per hundred parts of water, carrying 30% of K_2O. A crust from the top of a pit dug on the shore of the lake shows 47.72% of soluble salt, of which 24.97% was K_2O. Experiments are now being conducted on the ground in the expectation of marketing either the crude salt or extracting the potash and other byproducts. The extraction problems that must be solved are similar to those at Searles Lake.

International Map of the World

A world map, recently undertaken by agreement among the leading nations, is being prepared on the scale of 1: 1,000,000, one inch representing about 16 miles of the earth's surface. The map is to consist of about 1500 sheets, covering all the land areas of the world, each sheet representing four degrees of latitude and six degrees of longitude.

The first sheet of the United States portion of the international map has just been issued by the U. S. Geological Survey, and includes Rhode Island and portions of New York, Connecticut, Massachusetts, New Hampshire, Maine and Nova Scotia. This sheet, which is known as the Boston sheet, is printed in six colors and shows all the principal cities and towns, railroads, main wagon roads and other works of man, and the rivers, lakes and other water features. The different depths of the ocean are denoted by contour lines or depth curves and various shades of blue; the relief or altitudes of all parts of the land surfaces are represented by contour lines and color graduations, from pale green to brown, a different tint being used for each 100 m. of altitude. At the present rate of progress the United States portion of the map should be finished within eight or 10 years. The sheets are to be sold at 40c. each, this making a cost of $20.80 for the entire map of the United States.

Vulcan Detinning Wins Suit

The six-year litigation between the Vulcan Detinning Co. and the American Can Co., over the use of a secret process of recovering tin from scrap, has finally been decided in favor of the former by a decision of the Court of Errors and Appeals of New Jersey, the highest state court. Under the decision, the Vulcan company will recover from the American Can Co. about $600,000, representing the profits of its detinning works at which the Vulcan's process was employed. These plants were permanently closed by injunction several years ago and the judgment rendered represents the profits accruing in their four-years' operation prior to the suit. The decree allows the American Can Co. credit for the value of its useless detinning plants, of money for repairs, insurance and taxation expended.

The original suit involved the use of the sodium-hydroxide electrolytic process of treating tin scrap which, it was alleged, was divulged to the American Can Co. by confidential employees of the Vulcan.

Correspondence and Discussion

Views, Suggestions and Experiences of Readers

Forbestown District, California

I have read with interest the article by Lewis H. Eddy on the Forbestown district, California, which appeared in the JOURNAL of July 27, 1912. I am not prepared to criticize the article as a whole, but Mr. Eddy's notes on the placer deposits give the reader a prejudiced idea of the district which I believe to be unwarranted by the conditions.

In speaking of the placers of New York and Ohio flats, he states: "When the flats had been cleaned to the bedrock, the miners followed the pay toward the quartz croppings and worked up to the Miller, Shakespear and Burlington. The pay dirt of the placers was not gravel of stream origin, as is usual in placer ground, but a formation of red earth, evidently disintegrated from the quartz veins, and was worked by hydraulicking up to, but not above, the ledges." Figures as to the yield of the placers are then given, apparently as evidence of probable value of the veins mentioned.

The following are the conditions as I remember them, after an absence of several years from the district: New York Flat is the name given the stream which drains the southern part of the Forbestown district. This stream flows east of south, emptying into Dry Creek, and the waters eventually find their way into the Yuba River. In the lower reaches it passes over a hard igneous rock, but above this the bedrock is a soft decomposed granitic rock, probably diorite, and the valley widens out into a wide meadow or flat, which gives the stream its name. Ohio Flat is the name applied to the upper part of this meadow.

The first work done in this district was in the small ravines, as they could be easily drained. Some of the larger of these ravines were hydraulicked and the smaller ones were worked by sluicing and rocking. There is no tributary of New York Flat that has not been worked to its head. The larger ravines carried well washed gravel and smooth, rather coarse gold. The smaller streams carried less gravel, which was less worn, and usually carried less gold.

Sufficient grade for hydraulicking the lower part of the flat was obtained by working out the channel through the hard rock. This channel yielded but little, but the soft bedrock above was overlain by a bed of well washed medium gravel, varying in thickness up to about three feet. This gravel, I believe, yielded most of the gold of the district. It was overlain in general by about 5 ft. of blue clay and above this was about 15 or 20 ft. of sandy soil. In many places along the edge of the wash the deposit was much shallower.

After the passing of the Caminnetti act, a débris dam was built at the lower end of the flat and the remainder of the deposit was worked by hydraulic elevating.

It was the opinion of many of the men who worked in the flat that the immediate source of much of the gold was an old channel, which flowed practically parallel to and for a part of its course coincident with the present channel, but at a higher elevation. Where the old wash was not coincident with the present channel, it was practically all washed into it, leaving shallow diggings along the edge of the present channel. In some of these bench diggings the gold was found at or near the grass roots in a residual soil, often red from the decomposition of ferromagnesian minerals in the bedrock. The gold was coarse and smooth, some of the larger nuggets much resembling lima beans in size and shape. In some instances it was found associated with well worn quartz boulders ranging around 100 lb. in weight. These boulders, as well as the gold, were evidently the remains of a considerable wash, and while they were probably the result of disintegration of quartz veins, this is certainly not, as Mr. Eddy states, the origin of the red dirt.

Besides the veins mentioned, the drainage of New York Flat is crossed by thousands of small quartz stringers, some of which undoubtedly helped to feed the placers. In fact, I have picked specimens of free gold from one of these stringers not more than an inch wide. Another probable source of the placer gold is pockets in the larger veins of the district, of which there are several, which average of too low grade to attract much interest.

DONALD STEEL.

Brussels, Belgium, Oct. 2, 1912.

Penobscot Mining Co.

The report of a news correspondent under the heading of Montana, Beaverhead County, Penobscot Mining Co., in the JOURNAL of Oct. 26, 1912, p. 810, was in error.

The name of the company is the Penobscot Mining Co. The company is not a reorganization of the old Elkhorn Copper Mining Co. The Elkhorn mine was not worked by the Elkhorn Copper Mining Co. The new company has been in existence and operating mining property since 1898. The so called new company has not purchased the mining property of the Old Hecla Consolidated Mining Co., which included amongst other claims the "Hecla" mine. It is not the intention to run any tunnel, much less a 3000-ft. tunnel, under the orebodies at a low level, as stated. Ore is at present being taken from the mine continuously. Engineers are not surveying for the tunnel nor are they making any estimates of the quality and quantity of the ore now in sight. There are more than 20 incline shafts on the vein. No arrangement has been made with the Butte Electric & Power Co., on the Big Hole River, to supply power to the mine.

J. HENRY LONGMAID.

Camden, N. J., Nov. 13, 1912.

The Situation in Mexico

In the JOURNAL of Nov. 2, 1912, is an article entitled, "The Situation in Mexico," signed by L. A. Godfrey. Upon the face of it one cannot take the article as an index of the conditions existing in Mexico generally, as Mr. Godfrey has confined himself to a few statements concerning a particular camp in Chihuahua (name not mentioned), and it is readily seen that his feelings are a result of the fact that it was "his ox that was gored."

It so happens that I have been in Mexico during the greater part of the recent troubles, which began with the Madero revolution of 1910. During that time I have had occasion to travel through the north, south, east and west of this country, in populous and out-of-the-way places, both in *tierra caliente* and *tierra fria*. In consequence, I am not talking from hearsay, but from the result of personal observation, when I say that Mr. Godfrey's statements cannot be justly applied to conditions in Mexico generally. Although there have been instances, unfortunately too numerous, in which businesses, and mines in particular, have been temporarily paralyzed; it is these occurrences which have gained publicity, whereas nothing, naturally, has been said of the vast majority of the businesses which have remained undisturbed. Thus the impression has got abroad among people who have no other source of information than the press reports, that Mexico is in a condition of anarchy, or something akin to it. This is wrong, and as Mr. Godfrey himself states, "The ordi-

nary statements issued both in the United States and Mexico concerning the situation there are absolutely false."

The articles referred to also states that, "the federals make no effort to protect the mines," and that, "they are doing absolutely nothing toward the reëstablishment of order in the country." It states further that, "neither has he" (President Madero) "attempted to do anything."

The foregoing is notably untrue, as at two mines where I happened to be recently, the federal soldiers promptly garrisoned the property when the rebels threatened to attack. I could give further instances where, to my positive knowledge, the federals have furnished complete protection for mining properties which were menaced. Further, the prompt apprehension of Bernardo Reyes. the suppression of the Vasquez Gomez and Orozco revolutions, and finally the speedy crushing of the momentarily feared Diaz revolution in Vera Cruz, are surely adequate proof of what President Madero and the federal soldiers are doing toward the reëstablishment of order in the country.

Now while I do not claim that Mexico is enjoying absolute peace, I do most confidently affirm that, except in a few places, Mexico is a perfectly safe place for anyone who wants to come here and attend to his business. Let us be fair, and not permit sound judgment to be overbalanced by a passing emotion.

If the condition of the country can be at all judged by the condition of its chief industry, the following figures will be of interest, and may surprise some. The production of silver, which is Mexico's chief mineral product, as shown by exportation, during the first 11 months of the fiscal year 1911-12, shows a gain of $10,067,159 over the production of a similar period of the previous year, and the gain in production of copper, as shown by exportation, during the first 11 months of the fiscal year 1911-12 over the production during a like period of the previous year was $7,902,673. Although there was a falling off in the production of some of the other metals (notably gold), the aggregate production of all minerals during the first 11 months of the last fiscal year shows a net gain of $10,770,302 over the production during a like period of the previous year. Also, the value of exports during the last fiscal year show an increase of $12,400,000 over the previous year, and the value of the import duties during the same period, to quote the Minister of Finance, "exceeded those of the previous year, which may be considered as a normal year, in spite of the revolution, by about $2,000,000."

The foregoing statements are facts taken from the latest statistics, and far from indicating that, "Mexico is a disagreeable and dangerous country to live in," it indicates that it is making good progress in mining and nearly all other lines of business, which, of necessity, argues the prevalence of peace rather than danger. It is better for business men to go by the facts than to go by a "hunch," or someone else's distorted opinion.

Can anyone point out one specific instance of good that has resulted from all this "calamity howling?" Emphatically, no. Then let it be stopped, and do not try to scare people away who are anxious to come and cast their lot in this wonderful country which Humboldt so justly characterized as "the treasure house of the world."

ALBERT E. BLAIR.

Naica, Chih., Nov. 13, 1912.

Who Is a Mining Engineer?

Once more we hear the call of the wild, "Who is a mining engineer?" Instead of the old admonition, "Thou shalt not call thyself a mining engineer unless we (Broadway, etc.) give you our gracious permission to do so," we have this: "Take the chart and see just what you are and what your relative position is among your colleagues."

For the last day or so our staff has been a house divided against itself, as to whether Mr. Lamb's article was intended as a serious effort or whether we were merely given something to amuse ourselves during the winter evenings. Whatever was the motive it has afforded us some diversion from the routine of daily work, in establishing the "relative positions" of our friends.

This chart has in the last few days added (on paper) several new geniuses to the mining engineer's Hall of Fame, who otherwise would have been met by the "no admittance" sign, and no doubt several very capable engineers have lost their prestige by the selfsame chart.

As the chart practically disregards experience and ability, evidently money and publicity being considered more of an asset in the makeup of a successful mine manager, then by this means it is possible to create a "topsy turvy" world among members of the mining profession, which condition would be accurately expressed by the words of Smoke Bellew's partner, "Two and two don't make four no more."

While publicity is considered rather an important factor in determining the standing of an engineer, the notoriety given an engineer through the medium of either the technical or daily press owing to his connection with propositions not bearing the stamp of approval would, of course, lower his professional standing, but by the chart he could still maintain his standing. This would truly be a land of honey when the culprits and four-flushers could pat themselves on the back and say, "I am all right; look at the chart and see."

I would suggest that in order to make the chart complete and thoroughly effective, the experience factor be reduced to London, Boston and New York, also that a factor of social requirements and personality be added, so that the candidates who are to be admitted to the holy of holies of the engineering profession can be duly prepared. The scale can be arranged something on the order below.

Does the candidate dance?

Play bridge (poker is for the uncultured)?

Part his hair in the middle?

Wear a monocle?

Can he eat a seven-course dinner without getting excited?

Is he a social lion, etc.?

50% added for general etiquette.

The old chart, which has given good results in the past, ran something like this:

Can he get maximum results and efficiency with a minimum-cost sheet, consistent with good mining.

Missouri, Nov. 21, 1912 S. P. G.

[We incline to the opinion that Mr. Lamb intended to be amusingly ironical and that his spirit was of jest.—EDITOR.]

Scaling of Magnesia Brick

The general opinion on magnesia brick seems to be that expressed in the article "Copper Blast Furnace Settlers," in the JOURNAL of Oct. 12, 1912, that is, that the brick is subject to highly destructive scaling. This can be prevented in great measure by keeping moisture from these bricks; and, by avoiding sudden changes of temperature in the furnace, even when the bricks are laid in the old-fashioned way, in dry, powdered magnesite. In laying bricks dry, be sure that they are dry, and not dampened by a leak in the brick-shed roof. I have seen this cause spoil several expensive furnace bottoms. However, when the bricks are laid, using sodium-silicate solution and magnesite powder, magnesite walls stand up about as well as do the old-fashioned clay brick, so far as spalling goes, and, of course, much better, when fluxing action is considered.

It is also my opinion that many persons get discouraging results from magnesia brick because they do not take the precaution to lay them away from contact with silica. Whenever magnesia courses must be topped with silica brick, a course of chrome brick between them is imperative. I am reminded by this that I once tried powdered silica to lay magnesite bricks in, thinking a fluxing bond would be produced, but the results were not good. This may not have been due to any fault in the theory, however, but to some defect in its application.

J. A. THOMAS.

Pittsburgh, Penn., Nov. 23, 1912.

Righting the Calaveras Dredge

By Lewis H. Eddy

Due to the breaking of rotted planks in the hull, the 5-cu.ft. Calaveras dredge sank and overturned; the bow was left hard on bottom and the stern on the tailing pile, with no support amidships, resulting in severe racking. After lowering the water in the pond and pumping the hold dry, open seams were calked and the dredge floated to level ground where the hull was straightened and other repairs completed.

The 6-cu.ft. gold dredge operated by the Calaveras Gold Dredging Co. on Calaveras River at Jenny Lind, Calaveras County, Calif., resumed digging in March, 1912, after undergoing repairs and partial reconstruction necessitated by sinking and overturning. The history of this dredge is interesting in illustrating the relative life of steel machinery and wooden hulls in gold-dredge operation. Eight years of almost constant digging and two serious mishaps have demonstrated the remarkable strength and durability of the wooden hull and its capability for withstanding extraordinary and unusual strains.

In Operation Since 1903

The dredge was designed and constructed especially for this field in 1903; it was operated constantly until 1906 when it was beached by flood; again in commission from 1907 to 1911; was sunk, overturned, and badly racked in 1911; righted and repaired, and in 1912 is again in active digging. Barring further accident the dredge is good for the three or four years that will be required to complete the overturning of the 60 acres that remain of the 200 acres in the original holding of dredgeable land by this company in the Jenny Lind field.

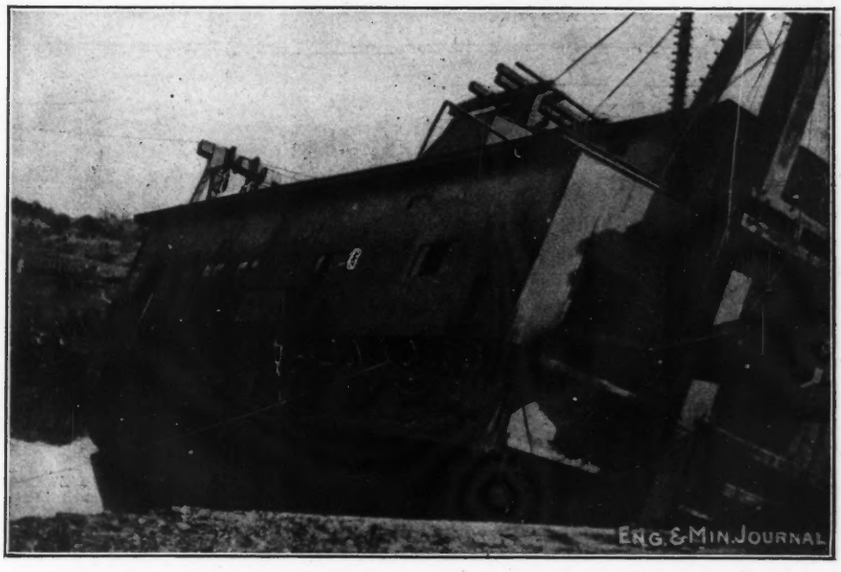
The hull is 96 ft. long, 36 ft. wide, 7 ft. deep. The digging ladder is of the plate-girder type, equipped with 77 5-cu.ft. close-connected Bucyrus buckets, designed to dig 36 ft. below the water line. The stacking ladder is 85 ft. long, carrying a belt conveyor 30 in. wide and 185 ft. long. The spuds are 50 ft. high; one is of wood and one of steel. The machinery was manufactured by the Bucyrus Co.; the dredge was constructed by the Western Engineering & Construction Co. The old style shaking screen and gold-saving tables are still in use. The dredge is electrically driven, being equipped with six Westinghouse motors. A total of 214 hp. is used; electricity is supplied by Western States Gas & Electric Co., of Stockton. The average depth of gravel excavated is 25 ft., and the maximum depth is 30 ft. The gravel is coarse, and a large part is overlain with hydraulic tailings.

Beached by Flood in 1906

On Dec. 10, 1906, the flood water in Calaveras River at the point where the dredge was operating raised 10 ft. and fell 7 ft. within 18 hr. The topography of the dredging land is flat; the river having a high bank on the opposite side, there was a heavy flow of flood water into the flotation pond carrying with it gravel from the tailings pile, filling and destroying the pond, and moving the dredge out of position. The ebb flow left the dredge aground with one side of the hull standing three feet higher than the other. In order to clear the ground and rebuild the flotation pond it was necessary to divert the course of the river. Recurrent floods continued through the early spring of 1907. When the dredge was again floated and ready for digging the electric power was shut off, owing to disturbance of the power plants and pole lines between Jenny Lind and Stockton. These disturbances continued for a month after the boat had resumed digging. In all this racking and twisting of the hull of the dredge, afloat and aground, no costly damage resulted; but constant attention and labor were necessary to save it from greater damage. The unusual strain of withstanding the heavy movement of the water and the grinding on the gravel proved the superior strength of the wooden hull construction. Following these interruptions the dredge operated until October, 1911.

Dredge Overturned in October, 1911

On Oct. 20, 1911, at 7 a.m., the dredge was sunk in 18 ft. of water, port side down, at an angle athwartship of 27° from the water line, the stern standing 3½ ft. higher out of the water than the bow. The bow was hard on the bottom of the pond, the stern resting against the tailings pile, and the port side was hard against the bank of the pond. The solid support at bow and stern, with no support amidship, caused the decks and side timbers to hog to the center. When the boat was beached and stood on level keel, measurements were made showing that the bow decks stood 3 ft. 5 in. above the water line; the stern deck 2 ft. 2 in. above, and the center 1 ft. 2½ in. above. Thus the center line had sagged 2 ft. 2½ in. in a length of 48 ft. from the bow, and 1 ft. ½ in. in an equal length from the stern. The cause of the sinking was the breaking of rotted planks in the port side of the hull.



Stern View of Calaveras Dredge After Water Level in Pond Was Lowered

The accompanying halftones illustrate the most interesting positions of the dredge: (1) A stern view after most of the water had been pumped out of the pond, showing the steel spud down; (2) stern view, the steel spud down, the wooden spud partly down, and the lower end of the tailing stacker hanging from the center; (3) bow view after the boat had been floated, showing the bow gantry, the twist in the digging ladder, and the 6-in. pump installed on the forward starboard deck used in keeping the bow end free from water after getting the boat on comparatively even keel.

Water Pumped Out and Seams Calked

The sinking of the boat toward and against the bank of the pond prevented it from turning completely over broadside, as no doubt would have occurred had the boat gone down in the middle of the pond. The first essential was to lower the water in the pond, which was done with a 5-in. centrifugal pump. When the water had been lowered about 10 ft., all the leaks in sight on the sides and bow and the forward deck were calked.

By means of a 6-in. pump installed on the starboard bow the hold was pumped dry. All seams found open were calked with oakum, and in addition strips of canvas four inches wide were used to cover all seams on the port side, the port bow; the starboard side, which was leaking worse than other parts, was entirely covered with canvas. The stern was also covered with 4-in. strips of canvas, and any leaks found in the bottom of the hull were similarly stopped. A 6-in. sand pump was then installed on the bow on the starboard side.

A 5-in. pump and a 2-in. pump were installed at the middle of the starboard side, and the filling of the pond was begun. Steel guys were made fast one each to the bow gantry, the middle gantry, and the steel spud, and pulled tight with chain blocks. Before the boat was floated both the steel and the wooden spud were pulled with a hand-winch. The water was turned into the pond on Nov. 25, at 2:15 p.m. In the meantime the tailings pile was leveled with team scrapers forming a bench 150 ft. long by 60 ft. wide with the purpose of floating the boat over the bench and beaching it in order to facilitate the work of straightening the hull and adjusting the machinery. It was questionable whether this could be accomplished, owing to the large quantity of sand; it was necessary to place brush on the tailings pile in the path of the horses as the work progressed to keep the teams from miring. By this method the bench was completed and ready for the boat when the water was deep enough to float it.

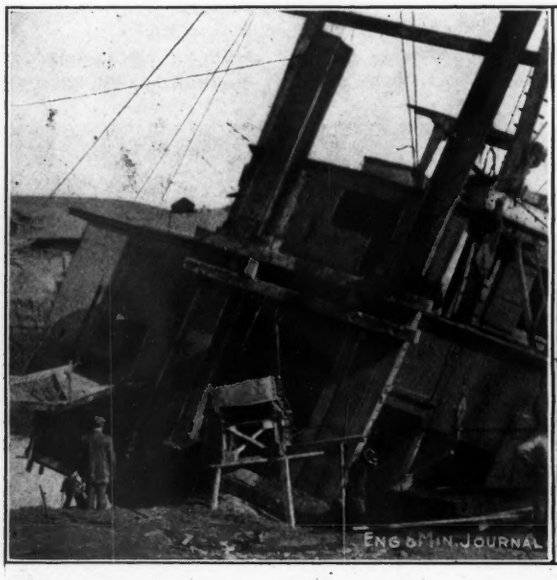
Placed on Level Ground and Straightened

On Nov. 27, at 9.20 p.m., the water was six feet deep over the bench. Then the turning of the dredge was begun; this was done entirely by hand, as electric power could not be conveniently applied. The boat was turned and stood in 7 ft. 4 in. of water over the bench at 1:30 a.m. on Nov. 28. The water was then pumped off the bench and only the water in the original flotation pond remained. This was done with the same 10-in. pump that was used to lower the water in the pond in the beginning of the work of righting the dredge. The dredge was then beached on a level keel in the sand and the bottom kept wet with a pump. In some places it was necessary to dig under in order to do some of the work on the hull.

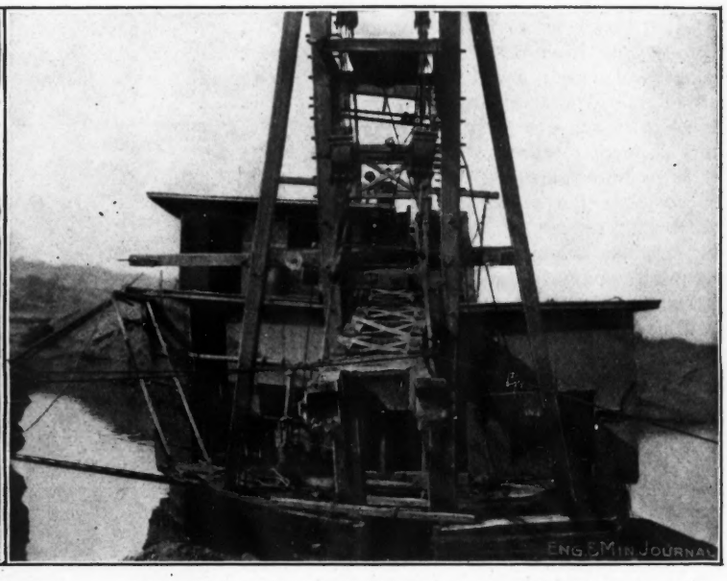
After getting the dredge on the sand the hog straightened, the bow and the stern settling down and the center returning to place. The hogging of the hull did not break any of the members forming the hull construction, owing directly to the expedition with which the boat was righted from the position in which it went down at sinking. However, the class of material and the workmanship in a large measure must account for the excellent condition of the hull after withstanding of the extraordinary strain on the center of the structure for 39 days. Add to this the eight years of digging strain and the strain of meeting the flow and ebb of the flood of 1906 for two or three months, and the record seems remarkable.

When I visited the dredge in the early part of February there were no evidences of the effects of the hogging; the repairs on the hull were completed, and the entire hull structure was being covered with a second coating of crude oil. Except for the absence of some of the machinery parts which had not yet been put in place, the appearance of various new pieces of plank and timber used in the repair of the boat and the fact that the dredge still stood on the bench instead of being afloat, there was no evidence that it had been racked and out of commission. The port pontoon also straightened after the dredge was beached.

The righting of the starboard pontoon was done by chaining down, and the replacement was an improvement on the former position. The dredge was floated in February, 1912; the replacing of the machinery was completed in the following month.



Stern View Showing Steel Spud Down and Wooden Spud Part of the Way Down



Bow View of the Calaveras Dredge After Boat Was Floated

Repairs to Hull Necessary

The repairs varied from the renewal of whole parts to the replacing of planks and stubbing the posts. The entire stern was rebuilt, the planking and inner timbers, with the exception of the bottom log, which was sound, being replaced with new. On the port side three new side planks were put in, extending from the stern forward for a length of 80 ft. On the starboard side five new planks replaced the old ones extending from the stern forward for a length of 70 ft. In the well hole on the port side four planks were replaced with new, one for the full length of the well hole, 50 ft.,

and three for a length of 20 ft. each. On the starboard side of the well hole five planks were replaced with new, one 50 ft. long and four 25 ft. in length. Two bottom planks in the well hole were replaced, one on each side.

The bulkhead back of the well hole was rebuilt. A new bow was built on the starboard pontoon. Some of the vertical posts were rotted at the lower end; these were stubbed at the lower end to provide a nailing surface, and in each repair of this character the stub and the end of the post were given a coat of crude oil; new planks were placed under the posts where they were found to be decayed. The two main posts of the bow gantry were stubbed at the lower end; some of the middle and the stern gantry posts were stubbed, others were found in good condition and required no repair. New decks were laid on the forward pontoons, and a new deck was laid from the tumbler gantry to the stern. The boat was also strengthened by trussing of members that in the building of the dredge were not considered necessary to be trussed. A truss was put in on the forward deck just forward of the deck housing, with two truss rods to hold the two pontoons in place and prevent sagging. A truss was put in the tumbler gantry; the truss rods extend down to the bottom timbers to hold the after-end pontoons in place.

Thorough inspection and overhauling disclosed rotted planks and timbers, chiefly at the joints of plank ends and the abutting of the lower ends of vertical timbers with deck planking or the edges of other timbers. The ends of timbers and planks naturally showed greater decay than edges of timbers and sides of planking, as the moisture is more readily absorbed through and along the course of the arteries, that formerly carried the sap or moisture of the live timber, than across the grain. It was observed that in no case where oil or grease from the machinery had penetrated the joints of connecting wood parts was there evidence of decay. But where there was no oil the timbers or planking were decayed whether directly exposed to dampness or not.

Timbers Treated with Crude Petroleum

In the repair work crude petroleum was used at all joints of vertical timbers with deck planking and at all splices of gantry timbers; and the entire hull inside and out was given two coats of petroleum. The petroleum was applied hot to give it deeper penetration. It is common practice in dredge building to use preparations containing petroleum as preventive of decay of wooden parts. In some of the specifications for dredge construction white lead is required to be applied to all joints. The use of crude petroleum is not unknown, but it has not become popular with dredge builders, probably because it is not a clean material to handle. There is no question as to its value for the purpose; nor as to economy. The cost of the petroleum used on this dredge was about $3; two 100-gal. drums, or about 4½ bbl., were sufficient.

In its reconstructed state, patched with new wood and spotted with black crude oil, and a black hull, the dredge is not now the attractive craft that was put in commission eight years ago; but it has the appearance in all its parts of being fit to withstand all ordinary strains of digging for even a longer period than will be required to finish the present field. At the time this dredge was constructed steel hulls were not considered; and though the wooden hull built for this construction, as shown by its remarkable history, was a model in many features, there has been such advancement in hull building that there seems to be no special or urgent demand for the innovation of the steel hull. Yet both the steel and the wooden hull have their places in the economy of dredge construction, but it is doubtful that the steel hull will supersede the wooden hull in the construction of dredges of 5- to 7-cu.ft. bucket capacity, especially where the field is limited to 10 or 12 years' digging for a single dredge.

The history of this dredge is, perhaps, the best illustration in California of the economy and durability of the wooden hull for this class of dredge. In the construction of dredges of 9- to 15-cu.ft. future practice will in all probability demand all-steel construction; and for shipment to countries where dredging lands are situated apart from timber-growing sections the steel hull may be demanded for all dredges. The head office of the Calaveras Gold Dredging Co. is in the Alaska Commercial Building, San Francisco. S. A. Moss is president; G. H. Sharrer, of Jenny Lind, is superintendent in the field.

Railroad Rates on Dynamite

In complaints filed against the Louisville & Nashville R.R., the Interstate Commerce Commission has decided that the rate charged on dynamite from Knoxville to Copperhill, Tenn., is exorbitant, and that the railroad must not charge more than the ordinary first-class rate on such shipments after Dec. 5 next.

In this case all of the shipments moved from Knoxville to Copperhill over the line of the Louisville & Nashville R.R. and charges were assessed thereon at a rate of 96c. per 100 lb. This charge is the double first-class rate applicable from and to those points. Complainant contended that any charge based on a rate higher than the first class is unreasonable because in official classification territory the maximum rate for the transportation of dynamite in carloads is the first-class rate, except as to some points on the New York, New Haven & Hartford R.R., where commodity rates are published approximately equal to one and a half times the first class; that the same is true in Wisconsin, Minnesota, Kansas, Nebraska, Oklahoma, Colorado and Texas; that from and to many points the rates are less than first class; and that in the Southeastern territory the first-class rate prevails except as to the local rates on the Louisville & Nashville and the Nashville, Chattanooga & St. Louis railroads.

It was further contended that, with the element of danger eliminated, dynamite, in view of its bulk in proportion to weight, easy handling, its loading capacity in the car, and its value, would properly be rated with articles taking the fifth-class rates, or approximately one-half of the first-class rate. If this is the proper classification when dynamite is charged at the first-class rate the charge is one-half for risk or insurance and one-half for transportation service; and when double the first-class rate is assessed the insurance charge becomes 300% of that for transportation.

Early History of the Bessemer Process

Some interesting early history of the Bessemer process is given by F. P. Wellman, in the *Journal* of the Cleveland Engineering Society, November, 1912. The information presented by him was received at the time of a visit he made to Sir Henry Bessemer, in company with Andrew Carnegie. Bessemer explained that the reason he was first induced to think of an experiment with a new process of iron making was the knowledge which came to him that the emperor, Louis Napoleon, was seeking a material to make better artillery than was then in use.

Bessemer's first idea was that he could make an improved wrought iron by blowing air through the liquid iron, instead of stirring it with a rabble to bring it in contact with metallic oxides, as was the practice in the puddling furnaces. To carry out this idea, he constructed a small stationary converter of firebrick. This was about three feet inside diameter, and much more in height. The pipes, or tuyeres, entered at the side not much above the bottom. They were all connected with the blast box, which encircled the converter, a pipe leading from this to the blowing engine.

The converter was covered and the hole in the side, near the top, was left as an outlet for the flames. When it was finished he sent to the iron store for a ton of pig iron—no other specification, anything would do so long as it was pig iron. Here was Bessemer's lucky day

He knew nothing at that time about the chemistry of iron or what composition was necessary in the iron to make good steel, so it was pure chance that it so happened that the iron, "Blaenavon," sent to fill this order was the only brand made in all England at that time that would have made good malleable steel under the conditons by which it was made. It was low in phosphorus and sulphur, high in silicon, and contained a little manganese.

So the first trial was successful in making a metal that when tried in a neighboring iron works rolled and hammered successfully. The bars were treated in many ways, both hot and cold, and proved to be so strong and tough that it created a great deal of interest in all who saw it. Bessemer said that if the steel had been made from any other brand of iron made in Great Britain that the result would surely have been a worthless metal, brittle and rotten at all temperatures, and that he would have abandoned the experiment at once. Certainly, it was a lucky chance that he sent to that particular iron dealer.

Wallaroo & Moonta

The report of the Wallaroo & Moonta Mining & Smelting Co., for the half year ended June 30, 1912, is an unusually important one, in view of the alternatives to be laid before the shareholders at the annual meeting: The abandonment of mining operations at the Moonta mine or the expenditure of about £7000 on development prospecting, says the *Mining Journal.*

In introducing the subject to the consideration of the shareholders, the report states that for many years the underground operations at this mine have been gradually contracting, owing to the working out of the ore ground and the declining value of the ore. The reports submitted to the shareholders of this company in March, 1891, show that even at that time the Moonta lodes, with the exception of Taylor's and Hogg's, were rapidly deteriorating in depth, and since then reference to these yearly reports will show an almost continuous record of gradual impoverishment and of unsuccessful exploration.

The available quantity of payable ore ground now left in the mine, so far as it has been opened up, is estimated to be only about 40,000 tons, of from 2 to 4%, yielding about 1000 tons of fine copper during the next 18 months, provided no serious difficulty occurs in the working of Taylor's remaining arches and a regular output can be maintained. The point has now been reached when, under existing conditions, it must be a matter for serious consideration whether closing the underground operations must not be regarded as an early possibility, contingent always on the price of copper and on any discoveries that may be made in the meantime. As to the latter possibility, there are certain parts of the mine which, although of no very great promise, yet possess a certain speculative value, and the directors have had under consideration for some time whether any of these places should be tested for payable ore ground before underground operations are suspended.

It is pointed out, however, that in the event of the mine being closed down, large quantities of slimes and tailings remain for treatment, from which it is estimated that an annual output of 600 tons of fine copper could be obtained for a period of at least five years by the cementation process, the operation of which has been quickened and improved by the ploughing operations in connection with the slime treatment.

The reports from the Wallaroo mines are that the deeper levels retain their productiveness, and though cementation has not been successful here the unit of flotation plant has been very satisfactory, raising the general recovery of metal to over 90%. At this mine also there are a large amount of tailings heaps, amounting to over 200,000 tons of material, from which it is estimated that 1000 tons of copper should be recoverable per year. The total output for the six months from the Wallaroo and Moonta mines was respectively 2116 and 417 tons of fine copper. It will be seen, therefore, that provided new plant is installed to a sufficient extent, there is no reason to suppose that the output of copper by this company need show any decline in the next few years.

The directors, however, observe: "It is questionable whether, even at the present price of copper, with these reservations from their profits, the directors will be able to undertake any great speculative work at the Moonta mines, and at the same time maintain the present rate of dividend to the shareholders."

New Russian Mining Laws

The Mining Department has decided to introduce a change into the Russian mining statutes in order that the real manager of mining work may possess technico-scientific qualifications insuring safety in working, says the *Mining Journal,* Oct. 26, 1912. It is proposed that all mining operations shall be divided into three categories. Managers of the first, most dangerous, category must be exclusively Russian mining engineers. But the responsible persons in the management of the second and third categories may possess only average or lower-class education. At the same time criminal responsibility will be more stringent for breaking the safety laws on mining operations, including imprisonment for two years, with deprivation of certain special rights and privileges.

Price of Osmiridium

In the report of the Tasmanian Secretary for Mines, for 1911, is given some interesting correspondence concerning the price of osmiridium. Certain of the Tasmanian osmiridium miners complained that the local buyers were only giving them about £7 per oz. for the metal and were selling it in London at about £20 per oz. This led to the following communication (slightly abstracted) from the Agent General in London.

The principal firm in London dealing in osmiridium states that it is utterly impossible for it to give a quotation on the metal without risk of being entirely misleading. There is probably no other mineral which varies more in its composition, even in the highly concentrated state, than osmiridium, and transactions in this mineral are invariably based upon each parcel for itself. Even an analysis affords no reliable basis for negotiations, inasmuch as the physical properties, such as size of grains, enter as a factor into the calculation of value.

From one of the Continental firms he received the following reply: The value of osmiridium depends upon the current demand for its constituent metals. The offer of one of these constituent metals on the market in any quantity lowers its price to an unprofitable degree, and as a result the refiner is left with stock for which it is difficult to find purchasers. Furthermore, this ore can only be valued after analysis of each consignment, as the metals of the platinum series which it contains are present in variable proportions. It cannot find a ready market similar to that for platinum ore, which is purchased according to its richness in platinum, a metal in regular use, in the same way as is done in the case of gold ore.

Osmiridium is of higher value if the shape of the grains is such that they can be used for pen points, although in Europe osmiridium is usually bought in order to extract the metals of the platinum series. As there is hardly any fixed market price for the rarer metals of this group, the price of osmiridium varies greatly.

In February, 1912, the price was between 3½ and 5½ marks per gram. It may be pointed out that this quotation, 3½ to 5½ marks per gram, is not far from the price of £7 per oz., stated to be obtained for the material in Tasmania. Inquiries of two firms of pen makers as to the price they are paying for osmiridium state that in April, 1912, they were paying about £11 per oz. for pen points. This price for special material is not a great advance on the £7 for the raw osmiridium from which it has to be selected.

Details of Practical Mining

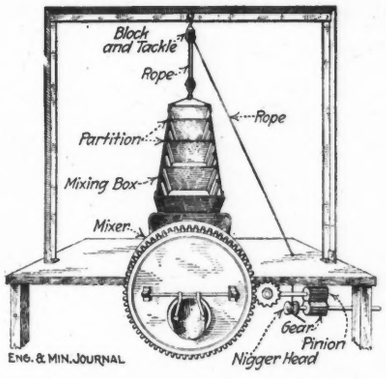
Accounts of Useful Ways of Doing Many Things in the Day's Work

Box for Measuring Concrete Mixtures

By J. R. McFarland

At the Giroux Consolidated Copper Co., Kimberly, Nev., trouble has been experienced in getting an accurate mixture for concrete. The available labor was ignorant and could not be depended upon; even should the men get the right number of wheelbarrow loads the amount would vary according to the energy of the individual.

An arrangement has now been made which assures an accurate mixture. A water-tight box is constructed of boiler plate with gates or partitions provided to slip into slots in the sides and divide the box off into compartments to give the different mixtures, as 1:3:5 or 2:4:6,



Box for Measuring Concrete Mixtures

etc. Each compartment must be filled, and it is easily seen before dumping whether or not the batch is of correct mixture.

The box being filled, the partitions are lifted out and the rear of the box tipped up, allowing the batch to run into the mixer. An original idea was designed for tilting the box. A block and tackle is attached to the rear end of the box at the bottom from the framework overhead. The rope runs under the platform and over a couple of rollers to a "nigger head," fitted on an extension of the engine shaft, as seen in the accompanying drawing. The end of the rope is given a couple of turns around the nigger head. When it is wanted to dump the materials from the box to the mixer, the engineer pulls the end of the rope tight enough to give it the friction necessary to lift the rear of the box by the block and tackle. Releasing the friction by releasing the end of the rope allows the rear of the box to drop down on the platform again.

Steel Timbering in an Inclined Shaft

By Frank R. Edwards*

Last spring, steel shaft sets were used for the first time in the Kentucky fluorspar district at the Memphis mines. These mines are situated about 4½ miles northwest of Marion, Ky., and in the past have produced more fluorspar than any other Kentucky mine.

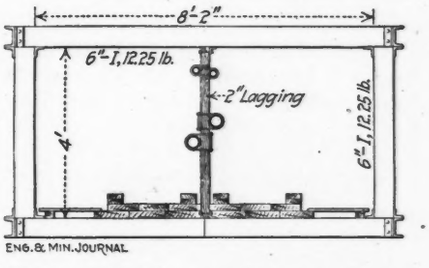
The veins occur in nearly parallel fault zones which have inclinations varying from 60° to 70° from the horizontal. Except in one or two instances, the shafts are sunk vertically till the vein is reached, then continued on the incline. This causes slow hoisting with the present arrangements, and trouble with pipe lines and hoisting cables; so it was decided to start at the point where the solid foot and hanging walls begin and continue to the surface on the slope. Steel sets with oak lagging were chosen as the materials.

It was first necessary to lay out some plans for proper alignment of the sets, and to have this alignment such that the construction on the incline could be done with the minimum of cutting work on the former slope. This was done by means of two wires on the hanging-wall side, properly leveled and aligned with the assistance of spirit level, square and straight-edge.

A sollar to catch all débris was first put in just below the point where the work was to begin. Then 10-in. sawed oak timbers were placed in hitches in the solid walls and at right angles to the proposed slope, as a base for the steel work. The bottom set of steel was placed immediately on this and consists of two wall plates, with holes on the wall side to nail or bolt on the lagging, and two end plates all 6-in. 12.25-lb. I-beams. The inside dimension is 4 ft. by 8 ft. 2 in.; the extra 2-in. length allows for the dividers, which are 2-in. oak plank bolted to 6x3½-in. angles fastened to the wall plates. For spacers, 6-in. 8-lb. channels are used. These are all connected by flanges which come from the manufacturer already fastened to the pieces by riveted bolts.

It was originally intended to have the lagging butt end to end at the steel sets, but this was found to make a weaker structure than lap joints, accordingly 6-ft. lengths of lagging were used to allow plenty of lap for the 5-ft. centers of the sets. These were placed like fore-poling with the butts inside to allow each set to be blocked and wedged at once and to aid in driving the lagging. For the first one or two sets there was enough solid ground to allow moving most of the original timbers and allow the steel and its lagging to be placed. Above that the ground was heavy; trenches were cut through the old timbers for the steel and the remaining wooden timbers meantime braced. Then piece by piece the old lagging was removed and new lagging placed, blocked and wedged tight.

At one place the old timbers came



Steel Shaft Set for Inclined Shaft

so far out of line that a big space had to be dug behind the new set. This caused a new departure; spiling was driven in the soft material deep enough to hold the ground while the steel and lagging were being placed, blocked and wedged true to line. It was difficult to make the holes in the steel fit together so drift pins were made especially for the work. At the point where the vertical and incline shaft meet the wet clay overburden became so heavy that the wall plates commenced to spring in, and it was necessary to put in the dividers, which had heretofore been left out to facilitate the work, and to true up the steel a second time. After passing the vertical part of the shaft the excavation had to be done entirely in wet sandy clay which threatened to cave so the men would not continue the work. The old sollar was cleaned off and a new one built near the work. Breast boards

*Mining engineer, Marion, Ky.

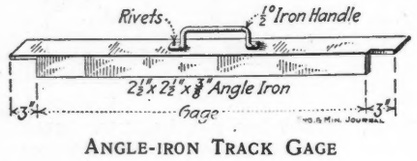
were placed ahead of the steel and braced in place to prevent excessive caving. Digging was now commenced at the top at sufficient distance from the vertical shaft to allow for the slope. The ground was cleared away to the vertical shaft and at sufficient width to allow work on the steel when it should reach this point.

As the digging continued the dirt started to cave and a sort of coffer-dam was built with long timbers for guides. Two-inch planks were driven ahead like sheet piling, additional guides being placed as braces. This solved the problem and the steel was soon run out to the surface. Heavy hewed-oak timbers were laid as sills to reinforce and hold up the top of the shaft lagging; these also acted as bearers for the head frame. The steel set at the surface was enlarged to support platform.

As sinking was to be continued in the shaft, a skidway was arranged by placing fillers in the I-beams on the foot wall and nailing direct to these. A ladderway was built beside this skidway in both compartments. The pipe lines were fastened to the dividing planks by U-bolts. The idea of this steel shaft originated with A. H. Reed, superintendent, and upon him and H. D. Wolford, foreman, devolved the execution of the work.

Angle Iron Track Gage

A serviceable track gage can be made from a piece of angle iron as shown in the accompanying drawing. One leg of the angle is cut away flush with the face



ANGLE-IRON TRACK GAGE

of the other leg and back from the ends 3 in. This gives the proper gage and the projecting 3-in. legs rest on top of the rails. A ½-in. round handle riveted on the upper or longer leg of the gage makes it complete.

With a little use track gages constructed of wood soon become so badly battered that they are practically useless and those made of iron are easily bent, thus giving in both cases a distance shorter than the desired gage of the track being laid.

Breathing can usually be restored after an electric shock within an hour, says *Coal Age*. Keep up artificial breathing for this length of time at least. After breathing starts, begin to restore the circulation by rubbing the limbs briskly in the direction of the heart and under the covers with which the patient has been previously covered.

Canvas Ventilation Pipes

BY L. D. DAVENPORT*

In some of the working places along the north shore line of the Chisholm orebody, on the Mesabi Range considerable trouble has been caused by lack of air. In cold weather, with the wind in the right direction, it was sometimes possible for the miners to work two or three consecutive shifts with the aid of carbide lamps. In order to facilitate the work in this part of the mine the company installed a No. 4 Sturtevant belt-driven fan, operated by a 7.5-hp. 220-volt Allis-Chalmers motor.

The fan and motor were placed in a shed at the collar of No. 1 shaft, which is now used as a timber shaft and manway. A 6-in. iron pipe was carried from the fan directly down the east compartment of the shaft to the 99-ft. level. At the 82-ft. level a 3-in. iron pipe runs 60 ft. along the bottom of the drift to a crosscut where it ends in an elbow. A piece of 2½-in. pipe is stuck loosely into this elbow and extends about 30 ft. along the crosscut. Enough air escapes from the elbow to supply the first working place and the balance carried by the 2½-in. pipe is sufficient for the second place.

On the 99-ft. level the 6-in. iron pipe runs along the drift for about 50 ft. and from that point a canvas pipe is used. The canvas pipe is made of 15-oz. duck, 30 in. wide the seam double stitched. The finished pipe is a little more than nine inches in diameter and is given one coat of boiled linseed oil. The pipe is supported every eight or 10 ft. by pieces of fine iron wire thrust through the seam at the top of the pipe. These wires are twisted around nails driven into the drift caps or in some places, driven directly into the ore.

The main pipe line is about 730 ft. long and from it there are four branch lines, 80, 100, 180 and 200 ft. long. The pipe in the 80-ft. branch is 9 in. in diameter and in the other three branches it is 5 in. in diameter. The connections for the branch lines, and for extending the main line, are made of light-weight sheet iron. The canvas pipe is drawn over the connections and tied with cord.

In all parts of the line the canvas pipe is filled out nearly cylindrical in shape. The air is now sufficiently good so that three eight-hour shifts are working regularly. When the slice rooms are worked back, the pipe is cut off in 40- or 50-ft. lengths and saved for use in another place. Plans are being made to use this system in another mine in this district and in this instance canvas pipe will be used from the collar of the shaft.

*Engineer, Oliver Iron Mining Co., Mesaba, Minn.

Reboring a Big Wheel

BY ALBERTO CASTAÑEDA*

It often occurs that some heavy machine work has to be done in a mining camp, the necessity for prompt completion of the work making it impossible to ship it to a properly equipped shop. In the absence of machinery and tools, a great deal of ingenuity must be used to get the work satisfactorily done. A case of this kind was in the reboring of the heavy grooved drive wheel of an air compressor at the plant of the Esperanza Mining Co., El Oro, Mexico.

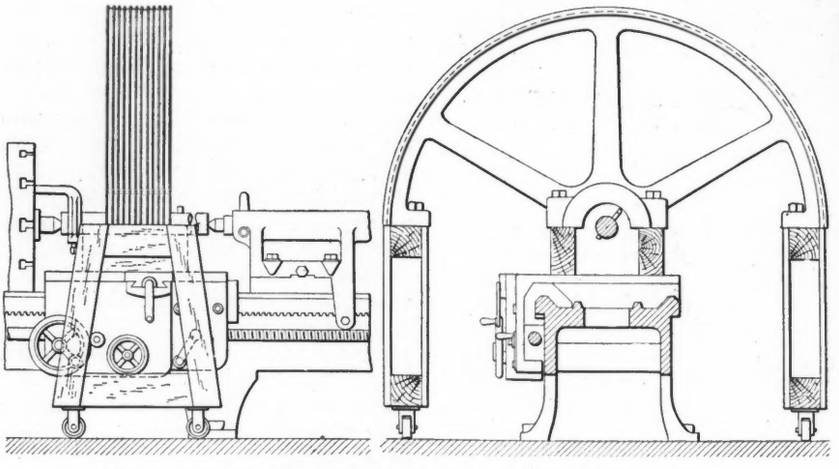


FIG. 1. ARRANGEMENT FOR REBORING A LARGE DRIVEWHEEL

The wheel in question was 13 ft. in diameter with a 26-in. face and weighed nearly 13,000 lb. The original bore was 8 in. and it was decided to increase this to 9½ in. There being no machine which would handle the wheel in the regular way, an original plan was carried out.

Two wooden benches were made and placed one on each side of a lathe, the benches being fitted with rollers. Half of the wheel was placed with the hub on the carriage of the lathe and one

*Master mechanic, Esperanza Mining Co., El Oro, Mexico.

end of the face on each of the benches. The half wheel was centered and cut out with a boring bar, the rollers on the benches allowing the whole contrivance to travel with the lathe carriage. The arrangement is shown in Fig. 1.

Half the wheel being bored, the other half was swung over it with chain blocks as shown in Fig. 2, and the two halves

FIG. 2. HEAVY DRIVE WHEEL REBORED AT MINE

bolted together. The proper centers were determined and the cut outlined and marked. This half of the wheel was then placed in the lathe, centered in accordance with the marking, and bored in the same way as the first half. The work was successful and the wheel runs true.

Collecting Mine Samples

For catching the broken rock in mine sampling, the Rand sampler usually takes with him an iron dish into which the pieces of rock fall as they are broken, says G. A. Denny (*South African Min. Journ.*, September, 1912). In place of this iron dish a round pliable basket about eight inches deep and 12 in. in diameter, lined with strong oilcloth has been found preferable. It easily fits into any corner or difficult place and does not allow the pieces of ore to escape by rebound as does the iron pan or box.

It is, however, only in places that preclude the use of canvas on the floor that a receptacle is used for catching the sample. Experience has shown that a better sample is obtained when all the sample broken is caught on a piece of canvas spread so that everything will fall on it. The canvas should be about 10 ft. long by about six feet wide for use in the levels, and it may be 10 ft. square for use in the stopes. The use of a canvas catcher tends to the taking of bigger samples, which alone is a great element in its favor. Rand practice would not, I believe, exceed the cutting of one to 1¼ lb. of ore per foot of sample cut. My present practice is to take not less than five pounds per foot of sample cut, and it often reaches as high as 10 lb. The object of this is to lessen the possibility of salting, as large quantities are less easily salted than small, and also to lessen the danger of over valuation from the inclusion of small specimen pieces of high-grade ore.

In cases where the sample is in excess of 15 lb., it is reduced by breaking down the whole sample in the mine to a gage not exceeding ¾ in., thoroughly mixing and quartering the total bulk in the usual way until a suitable weight, say from five to seven pounds, remains to represent the sample. In the assay office the mine samples are subsequently all reduced to pass ¼-in. mesh before being cut down, then halved in bulk by passing over a sample-dividing device. The ¼-in. material is then all reduced to pass a 20-mesh screen, again halved, the remainder reduced to pass a 40-mesh screen and the final sample for assay passed through a 100-mesh screen.

Drill Holder for Use in Handwork

A labor-saving device which promises to be an aid to prospectors and miners working single handed, has been invented by Thomas Peterson, a Butte miner and prospector. The invention is a hand-power drilling machine by which the work of two men can be done by one. It consists of a light metal drill holder, which can be used either as a tripod or attached to a bar. An ordinary miners' hand drill is inserted in the chuck and the tripod or bar so adjusted that the drill is held rigidly at the point desired. The miner then uses a double-handed hammer in striking the drill, and the force of each blow moves a cam on the chuck, giving the drill the necessary half turn to prevent it from sticking. For back holes or uppers, the bar or column is used in place of the tripod, and as the whole apparatus weighs but 15 lb., it can be easily managed by one man working alone.

Steam Shovel Stripping in the Black Hills

An interesting instance of surface stripping is being practiced by the Wasp No. 2 Mining Co., in the Black Hills mining district of South Dakota.

The orebody is approximately flat and consists of quartzite having a thickness of about 20 ft. The quartzite has been exposed on two sides by erosion. The capping over it consists of surface soil, quartzite and shale. At the lowest point there is only a foot or two of soil, while the covering thickens toward the north and south. The entire portion of ground owned by the company has been prospected by drill holes and it is estimated that there is sufficient ore, which can be recovered by this method, to last about eight years at the present milling rate of 500 tons per day.

STEAM SHOVEL REMOVING OVERBURDEN AT A SOUTH DAKOTA GOLD MINE

The overburden is removed by the use of an Atlantic steam shovel with a 1-cu.yd. bucket. At present the overburden removed is about 10 to 16 ft. thick. The shovel dumps the stripping into wooden, side-dumping cars, which are then trammed to the waste dump by two men.

After the overburden is removed and the surface cleaned, holes are drilled to the bottom of the quartzite, chambered with dynamite two or three times and a large charge of black powder, sometimes as much as 50 kegs, put into the hole. This loosens 4000 to 6000 tons of the ore, so that the most of it can be shoveled

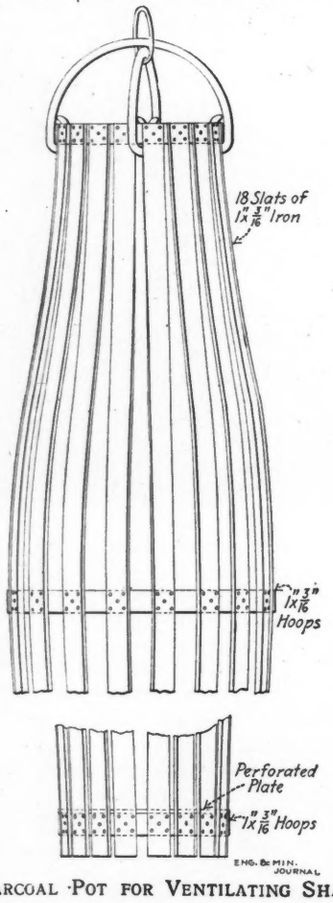
into the ore cars; the larger boulders are broken up with hand-size air drills of the "Little Jap" type. The ore is either shoveled directly into the skips or into 1-ton mine cars, which are then hauled to a bridge over the skipway and dumped into the skips.

A double-track skipway leads up to the mill bins, the skips being hoisted and dumping automatically into them. The maximum grade of the skipway is 10 ft. in 100, and a 52-hp. double-drum hoist is used for hoisting.

The cost of operation is approximately as follows: Labor, 27.2c. per ton; stripping, 7.8c.; explosives, 3.5c.; power, panying illustration shows the shovel in 1.7c.; total, 40.2c. per ton. The accomoperation.

Charcoal Pot for Ventilating Shafts

During the course of the sinking operations at the No. 6 shaft on the property of the St. Louis Smelting & Refining Co., in the Flat River district of



CHARCOAL POT FOR VENTILATING SHAFT

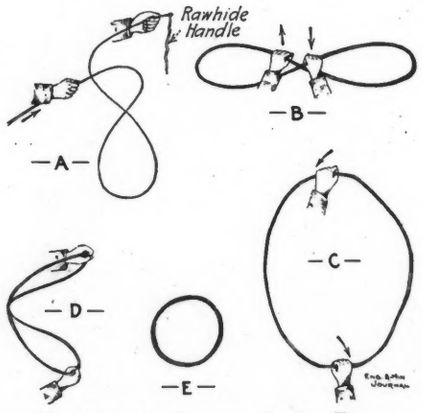
Missouri, a charcoal fire was used to induce ventilation and dissipate rapidly the fumes from blasting. The fire was built in an iron basket such as is illustrated in the accompanying sketch. This basket, filled with burning coals is lowered to the bottom of the shaft immediately after blasting. The heating of the air establishes an upward current over the heater, and a downward current at the opposite side of the shaft from that in which the ventilating pot is hung.

Coiling Steel Tapes

BY J. K. FINCH *

The following method of doing up an ordinary steel tape, or band chain, is much more rapid than using a reel and causes less wear on the tape, besides eliminating the necessity of carrying the reel.

The tape is first coiled as follows: Take the end of the tape in the left hand, holding the palm of the hand up, swing the right hand behind the body and, taking hold of the tape at about the 5-ft. mark, pull it forward and lay it over the palm of the left hand as shown in *A* of the accompanying drawing. Do not permit the tape to turn over. Closing on this coil with the left hand the right hand is now swung back for another 5-ft. length and thus the tape is gathered in in 5-ft. lengths, falling in concentric folds which may be crossed at the middle to form a figure 8. A good handle for



METHOD OF COILING STEEL TAPE

each end of an ordinary tape is a piece of ½-in. rawhide belt lacing about a foot long. These handles may now be used to tie ends of the tape to the coil.

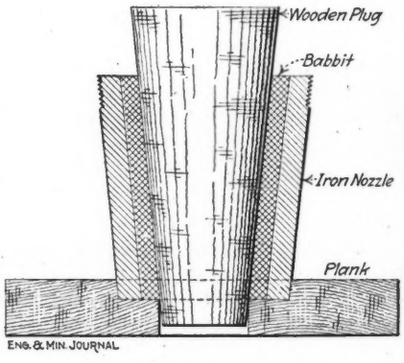
The next step results in forming the tape into a neat coil about a foot in diameter as shown in *E*. This is done as follows: Grasp the tape as shown in *B* one hand on each part of the coil at the center of the figure 8 and the upper part of the coil in the right hand. Now, without permitting the coil to turn in the hands, pull it apart as shown in *C*, keeping a slight pressure on the coil with the left side of the left hand and the right side of the right hand as indicated by the arrows. The tape will first stretch out as shown in *C*, then the right-hand portion will spring over in the form shown in *D* and the two sections may be brought together, forming the coil *E*. The operation of undoing the tape is exactly the reverse of the above described method.

*Instructor in civil engineering, Columbia University, New York.

Altering Size of Pelton Wheel Nozzles

A difference of as little as $\frac{1}{16}$ in. in the size of the nozzle supplying water to a Pelton wheel, according to C. M. Myrick (*Bull.* A. I. M. E., October, 1912), made a material difference in the wheel's speed. The proper size of the nozzle was found by trial, alteration of size being made as follows:

A hole, ¼ in. deep and equal in diameter to that of the iron nozzle to be reduced, is made in a board. The hole is then continued through the board of the same size that it is desired that the nozzle should be. A wooden plug, tapering from a little less than the outlet size of the desired nozzle to about the size of the admission end of the rejected one in a little more than the nozzle's length, is then made. The nozzle is then placed on the board and the wooden plug driven in, as shown in the accompanying illustration, and the space between filled with babbitt.



MOLD FOR NOZZLE LINERS

When it is again desired to alter the size, the babbitt can be easily melted out. It will be found that for a given pipe line, a point is eventually reached where even if the water supply is adequate, further increase in the size of nozzle does not give increased power. At this stage the loss from increased friction is counterbalancing the increased diameter of outlet. After this point is reached, it pays better to send the water over the spillway. To obtain the maximum efficiency the pulley on the wheel should be lagged so that the circumferential speed of the waterwheel approximates one-half the velocity of discharge, calculated from the available head.

It is clear that the size of the nozzle opening is determined by the size of the hole in the board, not by the size of the plug. One plug will answer for many boards.

Details of Metallurgical Practice

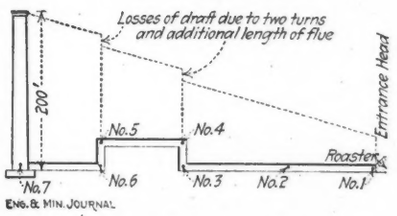
Records of Experience in Ore Dressing, Cyaniding and Smelting

Irregular Draft Reading in Smeltery Flue

BY LINDSAY DUNCAN*

In studying draft readings taken along the roaster flue of one of the Colorado lead smelteries I was puzzled to account for the irregularity of certain of the readings. The seven manometer connections were numbered consecutively from the roaster to the base of the stack and the readings may be assumed to have been taken simultaneously. No. 1 (roaster building), draft, 0.10 in. of water; No. 2, 0.20 in.; No. 3, 0.33 in.; No. 4, 0.23 in.; No. 5, 0.33 in.; No. 6, 0.50 in.; No. 7 (base of stack) 0.60 in.

On plotting an elevation of the flue and stack the "paradox" is at once explained. Between No. 3 and No. 6 the flue crosses several railroad tracks. This "siphon" caused the flue to approach what might be termed the "pneumatic gradient" and thus diminish the draft in the elevated portion of the flue. The accompanying illustration representing the draft graphically is self explanatory.



DRAFT IN SMELTERY FLUE

Detection of Carbon Monoxide

R. Nowiski, chief chemist of the Witkowitz collieries, in Moravia, has devised a compact piece of apparatus for detecting the presence of CO in air by means of palladium-chloride paper. The time taken by the paper to darken depends on the percentage of CO present. Thus, with 0.01% of CO, darkening of the paper perceptibly begins in 11 min., and is complete in 60 min.; 0.1%, 1 and 9 min.; 1%, 16 sec. and 2 min. Anything over 0.1%, says the *Gas World*, is thus detected with reasonable promptitude.

*Mechanical engineer, Steptoe Valley Smelting & Mining Co., McGill, Nev.

Smelting Cyanide Precipitate

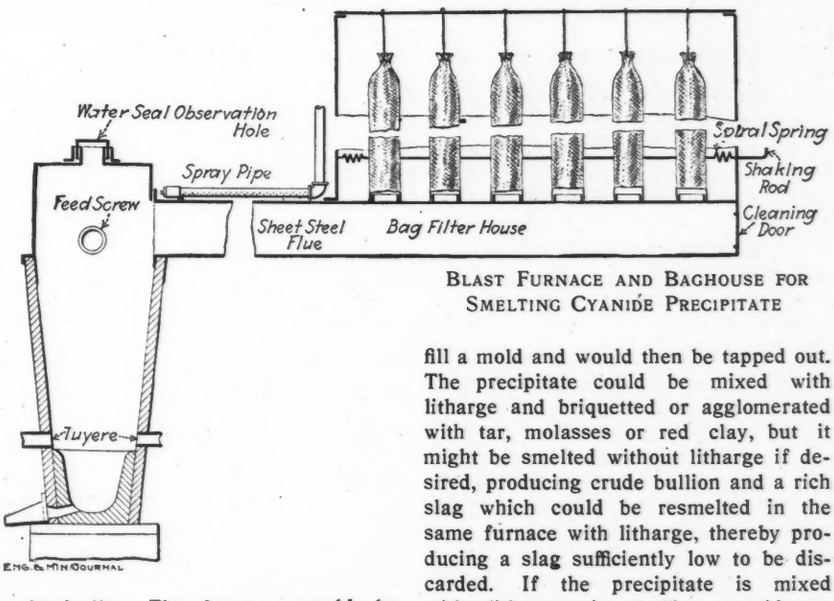
BY HIRAM W. HIXON*

Referring to the editorial on the treatment of cyanide precipitates in THE ENGINEERING AND MINING JOURNAL, of Sept. 7, under the heading "A Field for Improvement," I wish to offer as a suggestion the accompanying sketch of a small blast furnace and baghouse for treating these precipitates.

The blast furnace could be of any required dimensions, say, 15 to 18 in. in diameter at the tuyeres and of suitable height, say, 3 to 4 ft. above the tuyeres. The bottom or crucible section should be lined with clay or brasque. The charge would be fed in by a screw or piston feed so as to prevent the exit of gases, the feed to be operated by hand or mechanically. The furnace would be closed at the top except for a water-sealed opening for observation and this opening might also be used for introducing the charge if necessary. The gases on top of the charge should be under sufficient pressure to force them through the flue and baghouse. The baghouse should be at sufficient distance from the furnace so that the gases may be cooled either by radiation of the flue or by spraying the flue on the outside. The bags should be of sufficient number and dimensions to filter the gases from the furnace; they would be shaken from the outside by a connecting rod through the wall of the inclosing baghouse. A cleaning door should be provided at the end of the flue and all the bags placed in one line. The baghouse should be supported by suitable trestle work below. The furnace could be made of cast-iron plates with pipe coils cast in for water circulation and should be made in two sections so that it can be taken apart and cleaned easily. The blast would be supplied by a fan capable of supplying a sufficient volume of blast at a pressure of five or six ounces.

The operation of this furnace would be simple and would consist in heating up with sufficient fuel and then introducing the precipitate with the fuel required for its smelting and reduction. The crude bullion would be allowed to accumulate in the crucible until sufficient to fill a mold and would then be tapped out. The precipitate could be mixed with litharge and briquetted or agglomerated with tar, molasses or red clay, but it might be smelted without litharge if desired, producing crude bullion and a rich slag which could be resmelted in the same furnace with litharge, thereby producing a slag sufficiently low to be discarded. If the precipitate is mixed with litharge the bullion would require cupellation in a cupel furnace, the litharge resulting being returned to the blast furnace with more litharge for desilvering. A campaign of smelting precipitate might be followed by one of resmelting slag without blowing out the furnace and still maintain a separation between the two products by introducing sufficient fuel to insure the rich bullion being all reduced and out of the furnace before the lower grade material followed it. Running this small blast furnace in connection with a cupel furnace would allow the same litharge to be used over and over again and insure a clean-up of all byproducts.

The furnace gases must be kept under



BLAST FURNACE AND BAGHOUSE FOR SMELTING CYANIDE PRECIPITATE

*Superintendent, The Teziutlan Copper Co., Aire Libre, Puebla, Mex.

pressure to avoid the necessity for introducing a fan to force them to the baghouse. This would materially reduce the expense for construction and operation. The size of the furnace and baghouse should be in proportion to the amount of material to be handled. The value of the material to be handled makes it necessary to use a baghouse on the flue gases in order to avoid excessive losses.

This plan appears to be adapted to localities where electric power for smelting these precipitates is not obtainable and has the advantage over the direct melting of precipitates in a cupel in that all the flue gases would be passed through the baghouse and the losses due to fine material being drawn into the flue would be avoided.

The losses in cupellation of metallic bullion are not excessive while the introduction of fine high-grade material into a furnace of that character inevitably results in high losses and at the same time produces high-grade slags which must be resmelted in a reducing furnace, so that the primary treatment of the precipitates in a blast furnace instead of in a cupel furnace seems to be desirable.

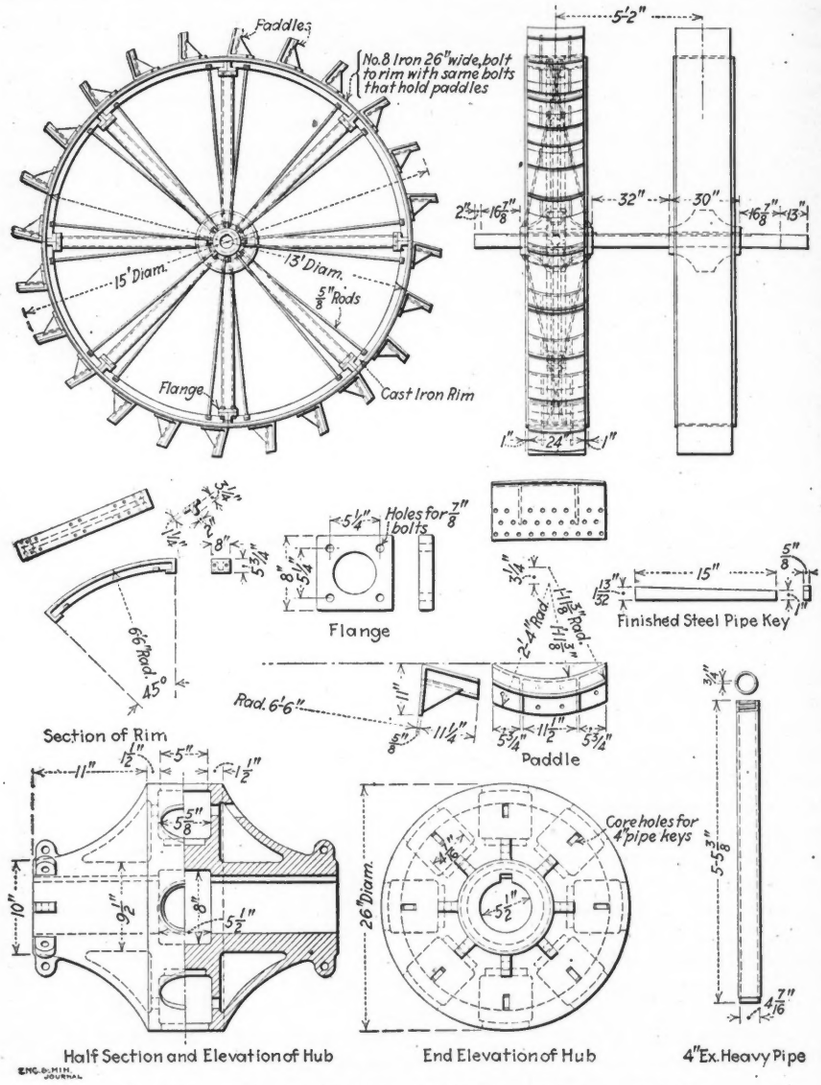
Federal Dewatering Wheel

In the accompanying drawings are shown the details of the construction of the shovel wheels used at the mill of the Federal Lead Co., in southeastern Missouri, for dewatering the tailings before they are fed to the stacking belts. The wheels revolve in a rectangular settling box, about 15 ft. deep, in which the tailings are allowed to build up their own bottom. The water drains from the pulp as it is scraped up the inclined floor formed by the tailings themselves. The height to which the tailings can be scraped depends entirely upon the diameter of the wheel. With a given wheel the limit is the angle of slope at which the tailings will slide freely off the scraper or shovel blades. This is about 35° with the tailings fairly well dewatered, but in practice the limit is about 45°, as with less slope than that the tailings drip off the shovel blades, and fall upon the rim plate that acts as a guard to keep the tailings from dripping back upon the interior of the wheel.

The general design of the wheel is the same as that of the dewatering wheel used at the Doe Run mill, described in the JOURNAL of Oct. 19, 1912, but the details are somewhat different. The Federal hub goes on a separate shaft instead of having the shaft an integral part of the hub. The shovel blades are made wider, and on that account they have two reinforcing ribs. This is much preferable even with narrower blades, as when there is only one rib there is a much greater tendency for the corners of the blades to break; although the fact that there is no false bottom in the settling box, has also aided in making the number of blades that have broken on the Federal wheels much less than at the Doe Run mill. The drawings show the details of the different parts. The rim is made up of eight sections that are held together by bolts at the spoke flanges.

Rods that fasten into the hub on the opposite side from that on which they are fastened to the rim hold the wheel together; the pipe spokes are lined up in the proper places, keys driven and the space around the pipe filled with zinc. A deflecting rim is, of course, provided to keep the tailings, which cling to the shovel blades, from dripping back on the spokes and hubs of the wheel.

These tailings wheels are driven in pairs, but with their shovel blades offset with respect to one another, so as to even up the load on the motor as much as possible. The wheels are driven by means of gears from the motor, which is connected to them by means of a rawhide pinion. It has been found that the best speed at which to drive these wheels when they are handling from 1500 to 1800 tons each in 24 hours, is 1½ r.p.m., as then the tailings are as dry as is compatible with handling that tonnage. These tailings, as they fall on the belt, contain from 12 to 15% moisture. It takes about 3 hp. to run the two wheels when they are handling 3200 tons in 24 hours. This is not the capacity of the machines, as by stepping up the speed slightly they could be made to dewater approximately 5000 tons of tailings in 24 hours, leaving only about the same amount of moisture in the tailings as at the present time. From the discharge lip of the dewatering wheels the tailings drop directly upon the troughed belt of the tailings stacker. The overflow fines from the shovel box go to the canvas plant for further treatment. The upkeep on these wheels is practically nothing, and it will be found that they offer a cheap way of dewatering large tonnages of pulp.



TAILINGS DEWATERING WHEEL USED BY FEDERAL LEAD CO.

Notes from Current Literature

Concerning Mining, Metallurgy and Industrial Chemistry

Scandium Extraction

Scandium may be separated from the wolframite minerals (double tungstates of iron and manganese) of Zinnwald, and Altenberg, and the copper minerals of Sadisberg, according to *Metaux et Alliages*, October, 1912. The extraction of scandium is by the following methods: The oxides of the wolframite are gotten into hydrochloric-acid solution, which is treated by boiling with hydrofluosilicic acid. The precipitated fluorides are then transformed into sulphates by sulphuric acid and precipitated as hydrates by ammonia and again gotten into hydrochloric-acid solution.

To this solution is then added hydrogen sulphide, after which a treatment with sodium hyposulphite is given. After decomposition of the hydrosulphite by the hydrochloric acid, the whole is precipitated by oxalic acid. In this method all the substances accompanying scandium (lead, copper, iron, manganese, other rare earths, and yttria) are eliminated, with the exception of thorium. To effect this separation advantage is taken of the insolubility of the double carbonates of scandium and sodium, $Sc_2Na_6(CO_3)_7.6H_2O$, in a solution of boiling soda. The separation of thorium and of other rare earths can also be made with success by means of potassium iodate, which throws down thorium iodate in a nitric-acid solution.

Alundum Decantation Thimbles

The use of an alundum thimble is recommended by L. W. Bahney, (*Met. and Chem. Eng.*, November, 1912) for removing acids from beakers in which electrolytic deposition has been conducted or for removing the supernatant liquid from a settled precipitate without disturbing it. The apparatus simply consists of a small alundum thimble fitted with a rubber stopper, through which passes a ¼-in. glass tube.

Mr. Bahney states that he began using this thimble to do work which he formerly performed by means of a piece of perforated platinum over the end of a ¼-in. bored glass tube, carrying a filter matte of asbestos, but that on one occasion after his supply of proper length asbestos fiber had become exhausted, he could not get any more that was satisfactory, although he purchased 14 lots from four different dealers. The alundum thimble makes a piece of laboratory apparatus without undesirable contingencies.

In using the alundum thimble for decantation purposes the glass tube emerging from it is simply connected to a suction pump. If this thimble is used in such an assay as the wet determination of copper, in order to draw off the supernatant solution after precipitating the copper on aluminum foil, any of the copper caught up on the thimble can be readily washed off afterwards by means of a little nitric acid. Other uses will also suggest themselves to the chemist.

England Forbids Soft Coal Exports

A development of significance both to the world's coal trade and in the uneasy European political situation is contained in London cable advices, which state that the British Admiralty has issued orders prohibiting the export of steam coal from England, says the *Boston News Bureau*.

This step to conserve the British coal supply for home warships and steamers will, if long continued, impose a severe handicap on rival navies and merchant fleets, which will have to resort to other fuel markets already fully engaged by demands of a world-wide prosperity. England in the nine months to Oct. 1 last, exported 26,765,000 tons of coal; of this, Germany bought 3,030,000 tons; France, 4,055,000; Italy, 4,015,000 tons. Even at that large volume England has had, as a reflection of last year's coal strike and present domestic business activity, less coal than usual to spare, a condition contributing to the present order. For the same nine months of last year, coal exports were 78% greater, at 47,619,000 tons. The price this year, including all grades, has risen to $5.32 average, against $4.81 last year.

The Admiralty itself has lately taken tenders for the coal required by it during 1913. Though details are not likely to be published, the Admiralty requirements usually amount to about 1,125,000 tons per annum.

This situation would normally offer export opportunities for American coal producers, were it not that every ton of domestic output is now in imperative demand. Our exports of soft coal, which for nine months of 1912 were 25,009,000 tons, were confined almost entirely to this continent, Canada taking 18,450,000 tons. If the foreigners come here for bunker coal, they can get little and will have to pay dearly.

Borchers-Pedersen Nickel Process

The recently patented process (U. S. patent 1,043,291) of Wilhelm Borchers and Harald Pedersen consists of the following stages. The ore is first smelted, preferably in an electric furnace, a high-silicate slag being produced. The nickel-copper matte thus obtained is roasted in such a manner that the copper and nickel are, for the most part converted into sulphate, but the iron into oxide. This result is obtained by keeping the roasting temperature about 600° C. The copper and nickel sulphate obtained from the roasting operation are then dissolved by leaching the residue with acidulated water obtained from percolation towers, through which the waste gases from the roasting furnaces flow in a counterstream toward the percolating water, and therefore cause it to contain sulphurous and sulphuric acid.

The residue from this leaching operation, which consists principally of iron oxide, but also contains some imperfectly roasted or over-roasted and therefore insoluble copper and nickel compounds, is added as a flux to the smelting operation. The insoluble copper and nickel are then converted into crude matte, while the iron oxide enters the slag. Fractional precipitation of the sulphate solution is then carried on by either sodium or calcium sulphide. The copper is thrown out in acid solution, and then the nickel is precipitated from the filtered solution by adding more of the alkaline or alkaline-earth sulphide. The nickel sulphide is then separated from the solution by filtration. The sulphides thus obtained are separately smelted to copper and nickel by smelting with a flux of limestone and a carbonaceous reducing agent, preferably in an electric furnace, calcium sulphide being obtained as a slag. Since the use of calcium sulphide as precipitating agent for copper and nickel will carry too much copper sulphate into the copper and nickel sulphide deposits, the calcium sulphide obtained in this operation is converted into sodium sulphide by treating, if necessary, under pressure, with sodium sulphate in aqueous solution. The sodium sulphide thus obtained may be used to better advantage than the calcium sulphide as precipitating agent.

The patentees make the following statement concerning this process: None of the separate stages of which the process is made up, is novel when considered alone. The smelting of the sulphide ores to obtain crude matte, the roasting of the matte to form sulphate, the leaching of the products of roasting, the gradual precipitation of first the copper and then the nickel from the solution, the electric smelting of nickel sulphide with limestone and charcoal to obtain metallic nickel are all processes well known in electro-metallurgy. Similarly, the substitution of calcium sulphide by sodium sulphide in the precipitation to prevent the precipitation of calcium sulphate is not novel in itself.

It was not previously known, however, that from nickel ores poor in copper, both these metals could be extracted practically without loss by smelting the ore to obtain a copper-nickel matte, with the subsequent process as outlined. This result is obtained in spite of all the imperfections of the roasting and leaching processes, by using the roasted and leached matte, which consists chiefly of iron oxide, as a flux in the first stage of smelting the ore to a nickel matte. In the present process only 80 to 90% of the copper and nickel contained in the matte are recovered in the form of sulphate. The remaining 10 to 20% stays in the residue and is recovered on the resmelting.

Efficiency of Bunsen Burners

At a recent meeting of the Scottish Junior Gas Association (Eastern Section), a lecture was delivered by H. O'Connor on the Bunsen burner, in the course of which he said that its requirements must be first known so that it can be specially designed. If it is required merely to produce heat in the form of a flame which will not deposit carbon on cool objects, 2.27 parts of air to each part of ordinary coal gas is required (*Chem. Trade Journ.*, Nov. 2, 1912). The desired quantity varies according to the gas used, because for complete combustion CO requires 2.38 times its volume of air; H, 2.38; CH_4, 9.52; ethylene, 14.28; propylene, 21.42; ethane, 16.66; acetylene, 11.90; benzine, 35.70 times its volume of air.

This refers to the complete combustion, and not to the primary combustion only, as in the case of the 2.27 parts stated above. For a straight coal gas containing H, 53%; CH_4, 33%; CO, 5%; and hydrocarbons, 4% (calculated as for propylene), 1 cu.ft. of gas of this composition requires 5.38 cu.ft. of air. For 1 cu.ft. of carburetted water gas (containing CO, 32%; H, 34%; hydrocarbons, 7%; CH_4, 16%), 4.59 cu.ft. of air are required. It can thus be easily seen that coal gas must be made to draw more air than the carburetted water gas; and if the gas is changed from day to day, sometimes with water gas, and sometimes without, the burner must be adjusted to give the best effect.

Precautions in Handling Acetylene

Owing to some recent accidents with acetylene burners, the French Minister of Commerce has submitted to a commission the question of precautions to be taken with the cylinders containing compressed gases (*Journal du Four Electrique*, Nov. 1, 1912). The following are the rules laid down: The cylinder containing compressed gases for autogenous welding, or for cutting metals, should not be used in workshops where there are floors above containing people. Before being placed in service each bottle should be placed in a ditch of which the sides are protected by battens of wood, and only the neck of the bottle should appear above the surface of the ground. The cylinder should be placed at least 5 m. from any fire. Each cylinder should bear legibly upon it the date of being placed in service, and the pressure to which it was submitted at the last test, and the date of the test. It is forbidden to employ any lubricating greases for greasing the valve, except glycerin or soapy water. It is equally forbidden to employ any heat to make it easier to open the valve, even though this opening proves to be difficult. In using oxyhydrogen gas for soldering there should always be a mixer between the bottles and the flame. There should be a distance of at least 3 m. between the neck of the flask and the neighborhood where the flame is to be used.

Electric Melting of Copper and Brass

In discussing the paper on electric melting of copper and brass, by T. A. Hanson, presented before the Buffalo meeting of the American Institute of Metals, G. H. Clamer states that personally he believes that the future for electric melting in the nonferrous-metal industry will depend not so much upon the saving which may be effected in the course of melting, as in the saving which may be effected in diminishing the loss of metal and in the production of a better product, resulting from the lessened contamination, with oxygen and sulphur adding influences. With the most careful crucible melting in coke-fired furnaces, metal will take up from 0.02 to 0.05% sulphur. Sulphur accumulates each time the metal is melted, and this accounts for the dark skin on remelted castings as compared with that on first-melted metal.

Another field where electric furnaces should be attractive is that for melting finely divided metal, which cannot be successfully accomplished in other types of furnaces, for reasons well known.

Correcting Bad Copper Deposits

In some work on the function of various addition agents used in electrolytic copper analysis, Ellwood B. Spear (*Proc.* Int. Cong. App. Chem., Vol. XXI, p. 99), was led to believe that a bad deposit might be corrected by adding nitric acid and re-electrolyzing. This proved to be the case. A pulverulent copper deposit was obtained, the electrolyte removed, and a new electrolyte substituted containing 2.5 c.c. of 1.42 sp.gr. HNO_3 in 100 c.c. of water. After a few seconds, the solution turned blue, after which electrolysis was again commenced and a good deposit obtained. It was found necessary to have from 1.5 to 5.0 c.c. of acid per 100 c.c. of water. With less there was no re-solution of the copper, with more the re-solution was too great, and the redeposition too slow or nonexistent.

From his experiments it would appear that the function of sodium chloride, gelatin, tannin, etc., which prove beneficial in commercial refining, is to dissolve small loosely deposited particles of copper, possibly holding them in colloidal solution, allowing them later to be deposited in adherent form. This solvent action would also explain the bad effects noted with too great an addition of these agents.

Sampling of Gold Bullion

Writing of the sampling of gold bullion, Frederic P. Dewey draws the following conclusions (*Bull.* A. I. M. E., Oct., 1912): That there are many cases where either a chip or drill sample will be satisfactory, but that if an assayer is unacquainted with the bullion, he is unsafe in accepting anything but a properly prepared dip sample. In many cases, particularly of cyanide bullion, the composition of the metal interferes with the assaying, and the bullion must be refined before the gold can be determined accurately.

If there is a great difference in drillings from the same bar, simple remelting will not help matters, the material must be refined as well as remelted. In general, it will be found on screening a drilled sample, that the fines will be lower in precious-metal tenor than the coarse.

Losses in Melting Brass Scrap

Some actual losses in melting brass scrap are given by R. A. Wood, in *Metal Industry*, September, 1912. Some leaded brass chips lost 6.147%, including the loss due to volatilization of adherent oil. Yellow brass chips lost 4.982%. (The coke required was 65% of the weight of the chips.) Another lot lost 5.009%, and another lost 7.581%. All these three last were lots weighing 40,000 lb. or over. Two lots of red-metal chips lost 5.595% and 5.362%, and required 66% of fuel to melt them.

Underground Mine Switches

By D. W. Jessup*

Stub and split switches with modifications suitable for heavy underground traffic are described. Special types of switches employed under particular conditions are discussed and various crossovers illustrated.

*Mining engineer, Bingham Cañon, Utah.

There are many varieties of underground track switches and nearly every mining camp will possess several of the many kinds. Different conditions demand different switches and one switch may be adaptable under a certain condition where another would not, depending upon the tonnage, the nature of ore hauling, track gage, etc. It is also found that a change of switches could be used to an advantage if sufficient trouble was taken to consider the conditions.

In underground track work, where there is heavy traffic, the switches in general use are the stub and split switches and their modifications. These switches are operated in various ways; usually by means of a stand and lever, a crank and lever, a toggle joint or a target. Where light traffic is concerned, especially a one-car traffic, the switch is operated by the hand or a kick of the foot and gives satisfactory results. In laying track it is important to remember that the frog should be elevated about one quarter-inch above the rails, as this throws the car against the rail opposite the frog and prevents the car wheels from catching the frog.

Stub and Split Switches

Fig. 1 illustrates a typical stub switch with a turnout *BB* from the main track *AA*. The switch points at *CC* are held together by means of a bridle *D* and fit into slots as shown in Fig. 2; with a broader gage more than one bridle is often used. The bridle is moved to and from *AA* to *BB* by various lever methods, principally by those given above, allowing cars to pass over either track. The throw or movement of the switch rails for an 18-in. track gage is about 1½ in. and a ⅛-in. space is left between the switch point ends to allow for easy shifting. Allowance for movement of the switch rails *CC* must be made; these rails are not spiked for a distance of 12 or 15 ft. back from the switch points, and to replace the spikes, clamps *E* are placed about every three feet from the points. Underneath the switch points a long, solid 6x6-in. tie is placed which extends to the switch levers, and facilitates the movement of the rails. To prevent wearing, a strip of sheet iron three or four inches wide is fastened to the tie underneath the points.

The typical railroad split switch is but little used underground in metal mines, except with a track of broad gage, and in mines with a large traffic, as it is expensive to make and lay, and is not adapted to short turns. A modified split switch is used as shown in Fig. 3. Two latches *A A'* are fastened to the rails *B B'*, as shown in Figs. 8 and 9, and are held together by a clamp *D* and a bridle *C*. The latches vary in length from 24 to 36 in. and are drawn to a point at one end, flattening the outside and leaving the inside about normal, or slightly curved inwards, the length of the taper depending upon the length of the turnout. The bridle is operated by one of the different switch levers.

Methods of Operation

The stand-and-lever switch is found in operation in a great many of the mines and affords satisfaction. It has the advantage over the crank and lever in that it offers a latitude in the throw of the switch as is often demanded in the double turnout, or if the rails spread and the switch points are not in line, while the crank and lever offers but one distance of throw.

The stand is spiked to a 6x6-in. tie which extends under the switch points, as shown in Fig. 4, and is placed about 18 in. from the track, allowing sufficient space so that a car running on the track will not strike the lever arm or stand. The latter consists of a double frame *AA* made from ⅜x1½-in. iron spaced ½ in. apart, and is riveted together at *H* and *G*. About two inches of the legs are turned out and fastened to the tie by lag screws as shown. The stand is about 20 in. wide, 12 in. high, and a double strap *B* is riveted across the frame about four inches above the bottom. The lever arm *C* passes between these straps and is fastened to it by a loose bolt or a pin at *D*, about which the lever is pivoted. The length of the lever is from 24 to 36 in. and the lever is bent inward so that a passing car will not strike it; the lever is held in place by a pin passing through the holes *E* in the stand. The lower end of the lever is fastened to the switch rod by a bolt or pin, the rod extending to the bridle. The stand is sometimes made so that the legs are spiked to the sides of the tie instead of the top, but it lacks stability.

The crank and lever-arm method of movement is shown in Fig. 3. An arm or switch lever about 18 in. long is fastened to the bridle at *E*, and the other end is fastened to the crank shaft at *F*. The throw of the crank should be exactly equal to one-half the throw of the switch, so that the distance the latches move is twice as great as the crank, measured from its two axes; that is, if the throw of the switch is 1½ in. then the length of the crank should be ¾ in. The length of the crank shaft is about four inches, and the other end of the shaft is fastened or fitted into the lever arm, the shaft is attached to a block or tie by means of a strap *H*. The length of the lever arm should be such so that when thrown towards the track it will not touch it. The weight on the lever arm is five or 10 lb. and is operated by hand. A piston rod and chuck from an old machine drill will answer the purpose.

Extension Switches

At times it may be convenient to have the lever situated at some distance back from the switch points, and of the several devices an eccentric or a toggle joint is often used. The eccentric is shown in Fig. 5. A switch rod consisting of a double strap *A* about 24 in. long and extending out from the bridle to a piece of timber *B*, passes over a lateral strap *C*, not being fastened to it. The strap *A* is riveted in two places *G*, spaced three inches apart and about 16 in. from the rail, the eccentric of the lever rod *D* passing through the space. A short arm *E* about eight inches long is attached by a pin or bolt to the lever rod *D*, and also to the lateral strap *C*. The eccentric of the lever rod is equal to the throw of the switch, 1½ in. The rod is jointed at *F* and extends to the switch stand. By operating the lever, the eccentric moving between the rivets *G* causes the switch lever to move the track from either point of switch.

The toggle joint, Fig. 6, is of more simple construction than the eccentric switch, and is perhaps more satisfactory. A switch lever *A* connects the bridle to one of the toggles *B*, the toggles consist of a double strap about eight inches long fastened at *C* and to the lever rod *D* by pins or bolts. By operating the lever rod *D* the toggles are pushed in or out, causing the bridle to move at the switch points.

The lever may be of simple construction, Fig. 7, and consists of a lever arm about 30 in. long moving on a pivot *B*, the latter being screwed to a block. The lever rod is fastened to the lower end

of the lever and extends to the toggles or eccentric. A guard rail is placed at the top of the lever, being nailed to the tunnel timbers.

With a track of heavier rails and broader gage, the railroad target switch stand is often used. It is designed for heavier work and is bought in stock, different sizes being manufactured. The stand is operated by means of a hand lever fastened to a head rod at the lower end of which is a crank connected to the bridle by a switch rod.

The following switches are designed mostly for one-car traffic; they give satisfaction, and are of easy manipulation, being adjusted by the hand or foot.

Kick or Latch Switch

This switch is recommended as being one of the most efficient of the lighter switches, due to its short length, its durability, and its easy adjustment by a kick of the foot or a movement of the car, the carman not finding it necessary to advance ahead of his car to adjust the switch unless running towards it. The only disadvantage is that if repairs are needed it may be necessary to remove the whole switch to the blacksmith shop.

The switch, shown in Fig. 8, consists of two short switch points or latches *A* 20 to 24 in. long and fastened to the rails at *B* by means of a looped strap; the points are tapered and turned slightly outwards. A bridle strap 14 to 16 in. long is riveted underneath to the points of the latches, the holes through which the rivets pass being of larger diameter than the rivets to permit the movement of the switch. The outside latch is one or two inches shorter than the inside latch, its length depending on the angle of the turnout. The looped strap fastening the latch to the rail is made of ⅜x1-in. iron and is bolted to both sides of the rail, the loop first passing through the ½x1-in. slot cut in the latch.

The latches may also be fastened as shown in Fig. 12, the strap being bolted to the latch through which a pin is driven into the tie. This method is unsatisfactory as the pin will pull out and cause derailments. Another and better method consists of fastening the latch as shown in Fig. 9, a lug being made on one side of the latch through which a hole is bored and a pin of smaller diameter is driven through the lug and into the tie.

Fixed Switch

The switch shown in Fig. 10 is not movable and has no movable parts that will wear, as all of the rails are spiked to the ties. Sufficient space, about 1½ in., is allowed between the main track and the rails to admit the passage of the car wheels. The direction of the car is controlled by the carman who throws the car to either track by a twist; this is easily done with an empty car but with a loaded car it is troublesome. This switch is used to advantage when the loaded cars are running away from the switch. If the carwheel has a grove or double flange worn on its face, the car may tend to follow in the direction of the turnout.

The railpoint *A'* should be in line with the main track, and as the point *A* may cause derailments, the rail at *C* is made lower than at *A'*, then the weight will cause the car to crowd closer to *C* and not tend to derail. The point at *A* should be slightly higher than the rail at *C*, which will assist the carman in throwing the car in the direction of the turnout. The length of the lead rail is usually from five to seven feet, depending on the angle of the turnout.

A special form of fixed switch is sometimes used, giving an unbroken main line, Fig. 11, requiring the use of two hinged latches *E;* they are about four inches long and are fastened to the turnout rails. When it is desired to run the cars over the turnout, the latches are placed over the main line, a flange on the under side preventing their slipping; and when running on the main line the latches are swung out. This form of switch is not commonly used. It is troublesome, as the latches may slip, take time to adjust, and they may accidentally be left on the main line, causing derailments.

Tongue Switch

The tongue switch, Fig. 12, is used extensively with tracks over which there is light traffic, but it is not recommended for heavy traffic, though it is often used for such. Derailments frequently happen due to an open switch, or the pin pulls out that holds the tongue, or the tongue may turn over on its side causing cars to drop in between the rails. The advantage of this switch lies in its simple construction, has but little repairing and is easily laid by the trackman. The movement of the car will not throw the switch as it will the kick switch, and it is necessary for the carman to advance ahead of the car to move the tongue.

The switch consists of a movable lead rail or tongue *A* varying in length from five to seven feet, depending on the turnout, and it is attached at the frog *B* by a looped strap *C* through which a pin about three inches long and of smaller diameter is driven into the tie. Underneath the hinge a piece of about 3x6-in. sheet iron is nailed to the tie in order to hold the pin. The point of the tongue is tapered and curved slightly outward; at this point a strip of sheet iron is nailed across the tie over which the tongue moves. The tongue may also be fastened as in Fig. 8.

The three-way switch or double-turnout switch is used where two crosscuts are driven on opposite sides from a main drift, and it is desired to run tracks in the crosscuts from the drift. In this case the stub switch will be used to best advantage. It is operated by the stand and lever which allows the latitude of the switch rails demanded by the nature of the switch, as illustrated by Fig. 13. To allow for the shift of the switch rails, they remain unspiked for a distance of 15 ft. or more.

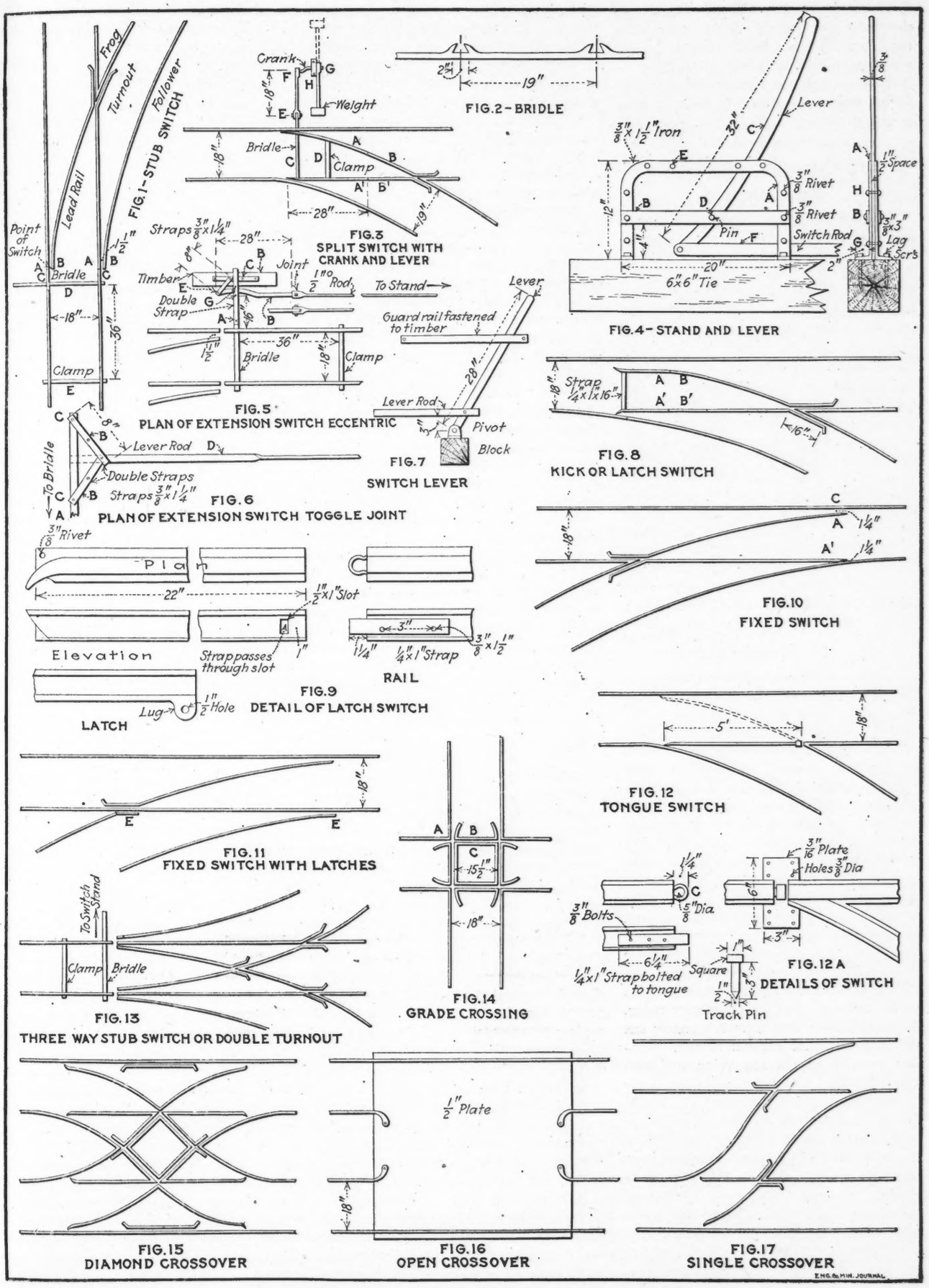
Grade Crossings

Crossings are used where tunnels or drifts intersect at right angles and it is desired to continue the tracks in the one direction without turning on the other tracks. The crossing, shown in Fig. 14, consists of four ordinary 90° crossing frogs *A* and the four inner crossing rails *B* which are a continuation of the tracks; the latter have a length of 15½ in. leaving a space of 1¼ in. between the point of frog and the point of crossing rail. An inner guard rail or square section *C* is often used, affording a more satisfactory track.

If the traffic is much heavier over one of the tracks, and it is desired to have the rails remain unbroken, then the track over which there is lighter traffic is raised 1½ or two inches above the other track, and hinged latches four or five inches long are swung over the main track to connect with the inner crossing rails when the lighter traffic track is to be used. When not using this track the latches are swung back again leaving the main track clear. But there is always the disadvantage of misplaced latches which give trouble.

A double crossover from one track to a parallel track is sometimes demanded. Fig. 15 illustrates the diamond crossover, one of the many kinds in common use. The switch points are fixed, there being no movable parts, and the direction of the car is controlled by the carman throwing his car. If desired, latch or tongue points may be used, operated by hand or by switches, which would probably be necessary if a train was running.

The crossover is somewhat intricate for the average trackman to put down correctly, and at times is also troublesome to use. It may be done away with entirely with a one-car traffic, and a large piece of sheet iron substituted as shown by Fig. 16. The inner rails are cut out leaving only the two outside rails, and if the carman wishes to cross over he throws his car by a twist and passes to the other track. If he wishes to continue on the one track he twists his car towards the outer rail. The inside rails are flattened at the end, curved outwards, and screwed down to the iron sheet. This



SWITCHES AND TRACK EQUIPMENT ADAPTED FOR MINE USE

open crossover may be substituted for the three-way switch, doing away with the guard rails and frogs. Fig. 17 shows a single crossover; it has but few parts, is simple, and gives no trouble. The switch points can either be fixed or used as a kick switch.

Quartz Mining in the Klondike District

A report on quartz mining in the Klondike district, by D. D. Cairnes, appears in the "Summary Report of the Canadian Geological Survey for 1911," just issued. The writer examined a number of the most promising quartz properties in the district, mainly in that section situated along and between Indian and Klondike Rivers and their tributaries. Quartz veins are plentiful in the schistose rocks, and although the greater number of these deposits are small and nonpersistent, the aggregate amount of quartz is great. Occasional encouraging assays have been obtained, but with rare exceptions it is not even approximately known what amount of gold the deposits in the different localities contain. The quartz is practically all free milling and but slightly mineralized, the only metallic constituents apparent being pyrite and rarely magnetite, chalcopyrite, galena and native gold.

Small Lenticular Deposits Most Common

A great amount of quartz occurs in the old schistose rocks, extensively developed in the district, the vein frequently exhibiting considerable variety of form, ranging in size from mere threads to masses several hundred feet in length, but in most places less than 10 ft. in thickness; one vein, however, on Yukon River, below the mouth of Caribou Creek, exceeds 30 ft. in thickness. The most common type of vein is lenticular in form, the individual lenticle measuring but a few inches in thickness and less than 50 ft. in length. In places where the veins are wider they are rarely traceable for any considerable distance. The lenses in most places follow in a general way at least, the strike of the schistosity of the containing rocks, but along their dips they frequently cut the wall rocks at various angles. Typical bedded or sheeted veins are also characteristic of some localities, the quartz occurring interleaved with the folia of the schists, the individual quartz bands being generally but a few inches in thickness. In places such deposits occur in zones up to 10 ft. or more in width, consisting entirely of alternate quartz and schist lamellæ, exhibiting a wide range of relative proportions. Typical fissure veins were also noted, which, owing to the decidedly schistose and fractured character of the inclosing rocks, readily pass into the lenticular or sheeted types. All types of veins are liable to bifurcate or branch out, smaller veins frequently uniting to form larger deposits. In places along lines of excessive fracturing, mineralized zones occur in which several of the vein types are represented. Often fair and occasionally even high assays are obtained, and in places the quartz shows native gold, but except in a few instances, it is not known what the gold content averages.

Examinations of the various properties show that the gold that does occur is always either associated with metallic sulphides, or is at or near the contact between the quartz and schists; in the latter case the gold is generally found in both vein and wall rock. It would thus seem possible that some of the fractured zones that have become irregularly impregnated with quartz, may prove of greater value than the more clearly defined massive veins, since the former contain a greater area of contact surfaces in the same volume or weight of material. However, the majority at least, of the mineralized zones examined do not appear to be sufficiently persistent to allow of their containing enough pay ore to make a mine, but it is possible that larger and more richly mineralized zones may be found. It is thought that since the majority of the veins are nonpersistent, the successful exploitation of the quartz will largely depend on finding groups of veins, or mineralized zones sufficiently close to allow of their being worked together. In a number of places several veins or zones have been noted in close proximity.

District Has Not Been Glaciated

The deposits already discovered in the Klondike in all probability represent but a small portion of the quartz actually existing, as bedrock is covered by superficial deposits in most places, except along the summits of the hills and ridges and along the sides of the secondary valleys where occurs the bulk of the quartz that has been found. Future prospecting and development may, therefore, result in the discovery of numerous deposits at present unknown. More development should be done in connection with the quartz deposits already discovered with a view to ascertaining their extent, and more systematic sampling and assaying should be performed to determine the average value of the gold content. It seems probable that at least the upper weathered and decomposed portions of a number of the deposits could be profitably milled. As the district has not been glaciated, a certain surface concentration of gold is to be expected, and is known to occur in some places. The most reliable and satisfactory assay results from free-milling deposits are obtained from mill tests of at least five or 10 tons, and a sampling mill capable of making tests of 10-ton samples of the quartz deposits of the district would greatly facilitate the development of the industry and stimulate prospecting.

Among the promising quartz properties are the Lone Star group, near the head of Victoria Gulch, a tributary of Bonanza Creek; the Violet group, situated along the divide between Eldorado and Ophir Creeks; the Mitchell group on the divide between the heads of Hunker and Goldbottom Creek; the Lloyd group and neighboring claims along the divide between the heads of Green Gulch and Caribou Gulch; and several groups of claims on Bear Creek, near where joined by Ludlow Creek. The only property on which development work, other than the necessary assessment work, was being done was the Lone Star, on which a four-stamp mill had been installed, and two shafts sunk to the depth of 60 and 40 ft. in addition to open cuttings. Electric power had been secured from the power line of the Northern Light & Power Co., on Bonanza Creek, four miles distant. The manager claimed to be able to mine and mill the ore for $3.50 per ton, and tests made indicated that at least the somewhat decomposed superficial portion of one or possibly both of the two main veins should yield pay ore.

In addition to the quartz deposits of the Klondike district, a number of quartz claims have been staked on Dublin Gulch, a tributary of Haggart Creek, which runs into the south fork of the McQuesten River, where a number of discoveries were reported. The ore seen by Mr. Cairnes consisted of quartz carrying varying quantities of mispickel and some typical samples yielded high assays.

Titanium in the United States

No rutile is known to have been produced in the United States in 1911, says the U. S. Geological Survey. The American Rutile Co. did not operate its property or plant, at Roseland, Nelson County, Va., but filled orders from its accumulated stock. Although it is probable that much more consistent results can be obtained by making ferrotitanium from rutile than from ilmenite, owing to the easier control of the percentage of the titanium and iron, ilmenite and titaniferous magnetite are much cheaper than rutile, and it seems that most of the ferrotitanium is made from titaniferous magnetite or from ilmenite. Ilmenite, however, is not suitable for making titanium carbide, used in electrodes for arc lamps and there promises to be some demand for this purpose. A small quantity of rutile was exported to Europe, and ferrotitanium to the amount of 51.17 tons was imported in 1911. It appears that 152,990 long tons of titanium rails were made in 1911, as compared with 256,759 tons in 1910. All other alloy rails amounted to only 999 tons.

Miners' Phthisis on the Rand—I

By Frederick L. Hoffman*

An investigation of miners' phthisis by the government of the Union of South Africa. The disease is not a bacterial infection, but an irritation and hardening of the lung tissue due to inhaled dust particles. Tuberculosis ordinarily supervenes in the last stages of the disease.

*Statistician, Prudential Insurance Co. of America, Newark, N. J.

On June 2, 1911, the government of the Union of South Africa appointed a commission to inquire into the subject of miners' phthisis and pulmonary tuberculosis in continuation of earlier investigations which were not considered conclusive. The commission was required to make inquiry into and report upon the following matters:

"The extent to which miners' phthisis and pulmonary tuberculosis are prevalent among persons employed upon the mines within the Union specified in Regulation 19, published under Section 4 of the Miners' Phthisis Allowances Act, 1911, and in particular to subject to medical examination persons who are, or have been, so employed."

Report of the Phthisis Commission

The commission consisted of seven persons with the Mines Medical Inspector as the chairman, and Dr. G. D. Maynard as the secretary. The report is dated Feb. 2, 1912, and briefly summarized, with critical observations, as follows: At the outset the commission points out that:

"A certain amount of apprehension was entertained in certain quarters that some of the miners might object to submit themselves to examination; notices were, therefore, prepared and sent to the mine managers, who were requested to post them in prominent positions on the various properties. These notices pointed out the confidential nature of the inquiry. No serious trouble was experienced due to unwillingness on the part of the miners to present themselves for examination; in the instances where some hesitation was shown a personal explanation sufficed to remove any prejudice which existed."

It may be assumed, therefore, that in the event that a similar inquiry were made in the United States an equal degree of willingness to cooperate would be met with on the part of the miners employed in this country.

The report includes a brief but most interesting description of mining methods on the Rand. Only a few extracts, however, can be given in this discussion, and a selection has been made of such as describe the probable relation of mining conditions to health in general, and the occurrence of miners' phthisis in particular. As regards temperature and humidity, it is said in the report that:

"The rock temperature increases with the depth of the mine—in a ratio of 1° F. per 220 ft.—and with this increase of temperature there is corresponding increase in the amount of moisture the air can carry. A hot moist atmosphere has an injurious effect on persons working in it. This question has been investigated by the 'Departmental Committee on Humidity and Ventilation in Cotton Weaving Sheds,' England, 1911; and it was found that injurious physiological effects began to be produced when the wet-bulb temperature rose over 75° F. In an article on 'Work under Pressure and in High Temperature,' appearing in *Science Progress,* January, 1908, Doctor Haldane says: 'It seems clear that for the economical working of a mine the wet-bulb thermometer should not in general be allowed to rise above 80° F., unless, perhaps, where there is a good air current.' The only means of reducing the humidity is by causing a good current of air to pass. In some mines the air is almost completely saturated, the wet- and dry-bulb thermometers showing little difference in temperature. It must be remembered, however, that a fan tends to dry the mine, as it removes an enormous amount of water (as much as 40,000 gal. per day on the Village Deep) as moisture in the air; and, therefore, the stopes and working places must be kept wet by sprays, etc., to prevent the raising of dust."

It would have been an addition of material value to the report, if the commission had included a statement of the ascertained facts regarding temperature and humidity conditions in the mines investigated. Such information would have been most useful for purposes of comparison or contrast with the corresponding conditions observed in the mines of our Western states. Mining operations as such, with special reference to dust as a predisposing cause of injury to health, are described in part as follows:

Raising the Most Dusty Operation

"Development may be described as the isolation by means of drives, winzes, and raises, of blocks of reef varying from 500 to 1000 ft. in length, and from 100 to 500 ft. in depth following the reef. Drives are tunnels, usually about 5 ft. 6 in. high by about 5 ft. broad, running parallel to the strike, or in other words, horizontally east and west on the reef, and roughly at right angles to the shafts. Winzes and raises are at right angles to the drives, running parallel to the dip of the reef and to the shafts, therefore approximately north and south. They connect the drives at intervals. The difference between these is that in a winze the rock is excavated from above downwards, and in a raise from below upwards. Raising is of all operations in mining the one in which the miner is most exposed to dust, because the holes are all 'dry' holes. It is consequently the most dangerous to health, and means must be adopted, such as jets of water under pressure, to prevent the escape of dust into the atmosphere."

The process of driving is described in the following abstract:

"Driving is done by means of rock-drilling machines worked by compressed air. The machine used, for drilling the holes which hold the blasting charge is of the percussive type, the hole being drilled by the abrasion of the rock. The drill which is fitted on to the machine is pounded against the rock by an air pressure of from 60 to 80 lb. The air, after performing the work on the piston, exhausts into the atmosphere, and this exhaust air as a rule constitutes the only ventilation in the vicinity of the dead end, or 'face,' of the drive. Unless suitable precautions are taken a large quantity of coarse and fine dust is formed by the percussion of the drill. Special difficulties in regard to dust prevention arise in the case of the top holes, because they are directed upwards. The introduction of water into these 'dry' or 'top' holes is more difficult than into the 'bottom' or 'wet' holes, which are directed downwards."

In machine stoping three machines are generally used on a stope face, which is usually of an average length of 200 ft. and a width of 72 in. "The most common practice is to drill over a 'bench,' or rectangular face of rock, with four holes. These holes are invariably 'wet' holes; but in cutting out a bench, say at the top of the stope, some dry holes are necessary. The most of the dust which escapes into the air is generated at the starting, or 'collaring,' of the hole. Some miners will not throw water on the rock when collaring, as they say it retards them in the rapid collaring of the hole. These holes are charged with blasting gelatin. There are as a rule six benches in a stope, three of which are drilled each shift. The average amount of explosive used is 33 lb. at each blast.

The result of the blasting does not pulverize the rock to the same extent as in development work, but the shock of the explosion is directly transmitted to a greater area of ground covered with fine dust, resulting in much dust being thrown into and remaining in suspension in the atmosphere."

Result of Former Investigations

Passing from this brief description of mining methods on the Rand, the report proceeds to the diagnosis and definition of miners' phthisis. The literature of the subject is reviewed, and previous investigations are briefly summarized as follows:

"Two facts of primary importance stand out in these results. First it is apparent that the excessive incidence of lung disease among miners, engaged in a certain class of metalliferous mining, is not a feature peculiar to the mines of the Transvaal, and, although the extent and character of that incidence may vary in detail in different mining communities, the broad fact is well established of the prevalence of fibroid phthisis as a specific occupational disease amongst metalliferous miners working in hard rock. Second, it is of the highest importance to note, that these investigations have everywhere led to the same conclusions as to the nature and causation of the disease, which has come to be commonly known as miners' phthisis; and the evidence they contain, together with the very large local experience of miners' phthisis, has enabled us the more readily to formulate a working definition of the disease we are asked to investigate, and to construct definite clinical standards for its identification and classification."

The foregoing conclusion appears to be quite generally accepted by medical authorities on the subject, but the commission reconsidered the whole question and restated its views regarding the pathology and symptomatology of miners' phthisis in the following statement:

It is primarily a chronic fibrosis of the lung, a chronic interstitial pneumonia as it is technically described. The irritant properties of the fine dust particles inhaled produce chronic catarrhal processes in the air cells and respiratory passages. From these a certain proportion of the dust particles are taken up and pass into the substance of the lung, where they produce a chronic inflammation, which results in the production of fibroid changes around each focus of irritation. These changes become in time distributed in varying degree throughout the whole lung substance, and in the fibrous framework of the lung, and the pleura which invests it. These fibroid areas increase in extent, and ultimately coalesce to form patches of consolidation, obliterating in the process the true lung tissue, and gradually but inevitably, encroaching on the amount of normal lung substance available for respiration. The process at once induces and is extended by the occurrence of recurrent colds, slight attacks of pleurisy, and localized catarrhal inflammations, and is aided, no doubt, by exposure to sudden variations of temperature.

The change is a diffuse one affecting both lungs, but not always equally. It takes a considerable time, commonly a period of several years, to impair the working capacity of those affected. It is not intrinsically an infective process, but is due to mechanical irritation, although its progress may be, and often is, accelerated by inflammatory attacks due to bacterial invasion. This is the primary condition found in all true cases of miners' phthisis—all are primarily cases of silicosis—which is the name given to the fibroid disease of the lung caused by the inhalation of stone dust.

This condition of simple fibrosis may exist and progress for years. But, in the later stages of the disease, the lung so damaged is commonly invaded by the tubercle bacillus. In at least the great majority of cases tuberculous infection becomes toward the end superimposed upon the preëxisting silicosis, and the symptoms and course of the disease become to a greater or less extent altered accordingly.

I have given this conclusion in full, because of its far reaching importance and practical value to medical and other students of miners' phthisis in America. It is in conformity to qualified medical opinion. Any differences in views are explained by variations of occupational conditions, including mechanical properties of the particular dust common to each particular mining center. With regard to this point of view the commission pointed out that such differences "do not affect the unanimity of the general conviction, that the inhalation of rock dust is the primary and immensely the most important cause of miners' phthisis, and that with the absolute elimination of this factor the excessive mortality from lung disease in miners should cease to exist." And they add that "the influence of occupational disease on the health of the miners is not, however, shown solely in the number of deaths returned as due to phthisis. It increases the number of deaths from other respiratory diseases also. Preëxisting silicosis increases the mortality from pneumonia, and the latter disease, when it does not prove fatal, is characteristically slow to clear up if fibrosis of the lung be present. It is apt to assume a chronic form, and may readily become the forerunner of eventual tuberculous infection."

Several Stages of Miners' Phthisis

It would considerably enlarge the present discussion to review the observation of the commission with regard to the different symptoms and several stages of the disease. These are differentiated into: (1) Early fibrosis, with slight shortness of breath, and recurrent bronchial colds. The general health at this stage may not be noticeably affected, but there is a definite impairment of working efficiency. (2) Advanced fibrosis when the shortness of breath becomes more urgent and distressing, the cough more frequent, and the expectoration more copious. It is at this stage that tuberculosis may, and as a rule does supervene as an exterminal phenomenon. When this occurs, the downward progress of the patient is usually rapid and a fatal termination is common. After a further review of medical opinions regarding miners' phthisis, including observations by Sir Thomas Oliver, the commission offers a brief working definition of the disease sufficient to express its essential nature as follows:

"Miners' phthisis is a chronic disease of the lungs, characterized by progressive fibroid changes in the lung tissue and pleura, and accompanied by chronic catarrhal processes in the air cells and respiratory passages. The disease is thus primarily fibrosis of the lung, and the essential factor in producing this condition is the more or less continuous inhalation, over long periods, of fine rock dust. All true cases of miners' phthisis are thus primarily cases of silicosis; silicosis is the feature common to them all.

In the later stages tuberculosis becomes commonly or invariably superimposed upon this condition, and the type of the disease becomes that of a tuberculous infection in a fibroid lung."

The commission points out, however, that: "Pure tuberculosis of the lungs undoubtedly occurs to a certain extent among underground workers, particularly in the earlier years of their mining life. But such cases are not cases of miners' phthisis as defined above—they are cases of ordinary consumption in a miner." In order to enable the commission to estimate correctly the prevalence of miners' phthisis on the Rand, it was found necessary to examine physically a number of miners actually at work. The number of underground miners thus examined with a record of their personal history was 3136, but in addition thereto the commission specially examined all of the employees of two principal mines with exceptional care, including the taking of a radiograph of the chest, and a bacteriological examination of the sputum where chronic expectoration was present. The number of such cases examined was 326 in addition to the 3136 cases previously referred to. The commission also considered the mortality returns of the Transvaal, and a few post mortem records of the Johannesburg Hospital. For the purpose of classification it was considered advisable to group the cases of miners' phthisis into different classes as follows:

Classification of Phthisis

Class 0. Normal Cases. These include, of course, all men with normal lungs, but they also include a small number of men, in whom no positive evidence of the presence of silicosis or tuberculosis was present, but who presented signs of old or

recent conditions which were not quite normal, e.g., emphysema, bronchitis, or thickened pleura over an area of the lung which has been the seat of a previous pneumonial, and a few other similar cases.

Class I includes cases where the history, symptoms and appearance of the miner pointed to his probably having the disease, but where no definite physical signs of its presence could be found on examining the chest. We have reason to believe that, with ideal conditions for carrying out the physical examination, the number included in this class would be diminished by absorption either into the class "normal" or into Class II. This, indeed, was found to be the case in the results in the special examination held at the Simmer & Jack hospital. That a small number of men do suffer from symptoms of the disease in whom no clear physical signs of its presence can be found by clinical examination, is, we think, undoubted. This was borne out by the results of the special examination, where undoubted radiographic signs were found in cases in which a careful examination by two or more examiners had failed to show any abnormal physical signs. Nevertheless, the cases returned under this heading are to be regarded as borderland cases, in which the presence of fibrosis has been strongly suspected but not demonstrated.

Class II. In this group were classified all miners who showed undoubted, although frequently slight, physical signs of the disease, but whose working capacity was not impaired. They were men who were capable of undergoing a normal amount of physical exertion with at the most but little discomfort.

Class III. In this group were included more advanced cases, where the disease has progressed to a stage which produced a definite degree of physical incapacity accompanied by the complex of symptoms and physical signs which characterize intermediate fibrosis. The expectation of life of men in this class is seriously diminished.

Class IV represents the terminal condition, with practically absolute incapacity for underground, or, indeed, for any kind of work. In these cases the disease has advanced to such a degree that the sufferer is hardly able to undergo the slightest exertion without suffering from breathlessness. In this stage a secondary tuberculous infection is common.

It is explained further, that: Classes I and II thus coincide with cases of "early fibrosis," while Class III corresponds with those of "intermediate fibrosis," and Class IV with the group "advanced fibrosis."

(To be concluded)

Halloysite near Rome, Ga.

The halloysite mines of the North American Chemical Co., which are situated near Gore, Ga., on the eastern slope of Taylor's Ridge, about 24 miles north of Rome and near the present terminus of the Rome & Northern R.R., are to be exploited. The land on which the mineral is known to occur is on the lower slope of the ridge and covers approximately 1000 acres. The seam varies in thickness from four to six feet, and is estimated to contain 15,000 tons per acre.

A plant is to be erected by the North American Chemical Co., in the vicinity of Rome, for the manufacture of alum from this ore, which is a hydrated silicate of aluminum containing about 37% Al_2O_3. It is said that, although experiments have been made at various times to produce aluminum sulphate from halloysite, the present enterprise marks the first commercial plant actually using this ore as a raw material for aluminum-sulphate making.

Chemistry of the Anaconda Reduction Processes

The chemistry of the reduction processes at Anaconda, Mont., was discussed by Frederick Laist, before the International Congress of Applied Chemistry. The various departments of the reduction works are: Concentrator, roaster, reverberatory, blast furnace and converter. Of these, the concentator has no chemistry, its only function being to wash out the excess of the siliceous gangue of the ore (with a minimum loss of copper, silver and gold) over that required for good smelting.

Roastjng-furnace Reactions

All concentrates finer than 5 mm. are called fine, and go to the McDougal roasting furnaces. These concentrates make up 90% of the charge, the other 10% being fine ores and limestone. This last is not decomposed in the roaster. On the first hearth the concentrates are simply dried. On the second the roast commences:

$$7\,FeS_2 = Fe_7S_8 + 6\,S$$
$$6\,S + 12\,O = 6\,SO_2$$

On the following hearths, the temperature gradually increases to a strong red heat and the various constituents are roasted according to the following reactions:

$$FeS + 3\,O = FeO + SO_2$$
$$Cu_2S + 3\,O = Cu_2O + SO_2$$
$$CuS + 3\,O = CuO + SO_2$$
$$Cu_3FeS_3 + 10\,O = 3\,CuO + FeO + 3\,SO_2$$
$$2\,Cu_3AsS_4 + 25\,O = 6\,CuO + As_2O_3 + 8\,SO_2$$

All of the arsenic is, however, not driven out, but a portion unites with the copper oxide to form arsenate and arsenite, which do not decompose until it reaches the reverberatory furnace, where a portion goes into the slag, the remainder into the matte. When too much air is admitted, the calcine becomes red, because of the reaction:

$$2\,FeO + O = Fe_2O_3.$$

The formation of sulphates takes place as follows:

$$FeS + 4\,O = FeSO_4,$$

or, perhaps more accurately

$$FeS + 4\,O = FeO + SO_2 + O = FeO + SO_3 = FeSO_4.$$

When Fe_2O_3 is present, owing to its powers as a catalyzer, it is probable that at least a part of the sulphate is formed in this way. Copper sulphate is formed partly in the same way that iron sulphate is formed, and probably, in part:

$$CuO + FeSO_4 = CuSO_4 + FeO,$$

since ferrous sulphate will decompose much under the temperature at which copper sulphate decomposes.

Reverberatory Reactions

As the atmosphere in the reverberatory is almost neutral, the oxygen must have been added before the materials are placed on the hearth. The limestone decomposes:

$$CaCO_3 = CaO + CO_2,$$

and the iron and calcium oxides unite with the silica to form 86% of the slag. The Anaconda reverberatory slag is $8\,FeO.CaO.9\,SiO_2$ (a bisilicate). To reduce the cutting of the reverberatory bottom to a minimum, a slag should be used which is practically saturated with silica at the prevalent furnace temperature. Of the remaining 14%, about one-half is alumina, and the other half, MgO, MnO, Cu, S, alkalis, carbon, etc.

There has been an immense amount of discussion as to whether alumina is an acid or a base. Mr. Laist believes it to be amphoteric, according to whether bases or acids predominate in the slag. However, both series of aluminum compounds seems to be difficultly fusible and gummy.

The reactions which yield matte are dependent primarily on the power of sulphur, combined with iron, to reduce copper combined as oxide or silicate.

$$4\,FeS + 6\,CuO = 3\,Cu_2S + 4\,FeO + SO_2$$
$$4\,FeS + 4\,CuSiO_3 = 4\,FeSiO_3 + 2\,Cu_2S + 2\,S$$

The simple reaction

$$FeS + CuO = FeO + CuS$$

is impossible, as CuS is unstable at high temperatures, breaking down into $Cu_2S + S$.

While much has been written concerning the harmful effect of Fe_2O_3 produced in roasting, it cannot be very serious, since sulphides would reduce this, thus:

$$3\,Fe_2O_3 + FeS = 7\,FeO + SO_2.$$

Practically all the sulphur not required for these last reactions goes into the matte, so calcination is carried to such a point that there is just enough sulphur left to cause the formation of a 40% matte.

Blast-furnace Reactions

In the upper part of the blast-furnace charge column, a certain amount of roasting goes on and FeS_2 and $CaCO_3$ break

down, yielding S and CO_2, respectively. The oxygen of the blast is well utilized, as is shown by the clouds of yellow sulphur which appear when a fresh charge is dropped on a hot top. There is not enough O present to burn the S set free.

Bessemerizing of the sulphides, and oxidation of the coke, as well as union of the metallic oxides and silica, take place mainly in the tuyere zone. The Anaconda blast-furnace slag is mainly a sesquisilicate $7FeO \cdot 9CaO \cdot 12SiO_2$. As the amount of oxygen is limited by the blast, any excess of carbon will prevent oxidation of the iron. Converter slag, $(FeO)_2SiO_2$, probably reacts thus:

$$(FeO)_2SiO_2 + SiO_2 = 2FeSiO_3$$

$$2(FeO)_2SiO_2 + SiO_2 = (FeO)_4(SiO_2)_3.$$

Copper silicates are reduced as they are in the reverberatory.

Converter Reactions

The charge to the converters carries about 7% less copper than is called for by the formula $Cu_2S \cdot FeS$. The converters are magnesite-lined, and the silica needed to unite with the iron oxide is supplied by adding ore. During the first half of the blow the reactions are:

$$FeS + 3O = FeO + SO_2$$

$$2FeO + SiO_2 = (FeO)_2SiO_2.$$

It is important that the slag be poured from the converter as soon as all but about 1½% of the iron has been eliminated, otherwise the charge foams out through the converter mouth. The reason for this is not clear, but is probably due to the formation of copper silicate, which thickens the slag, and prevents free passage of the air.

The slag having been removed, oxidation of the copper sulphide commences as follows:

$$Cu_2S + 4O = 2CuO + SO_2$$

$$Cu_2S + 2CuO = 4Cu + SO_2$$

The progress of these reactions is indicated by the color of the converter flame. This is green while the iron is oxidizing, blue just before removing the slag, and red while blowing the Cu_2S to copper.

The matte always contains more or less impurities, the chief ones at Anaconda being lead, zinc and arsenic. Experiment has shown that these are oxidized and eliminated as fume during the slag-forming period of the blow. This elimination is practically complete with zinc and lead, and is nearly so with arsenic. Little arsenic is eliminated during the copper-forming period.

The copper is taken from the converter to the refining furnace in a molten state, and carries about 98.5% Cu, the silver and gold for which it serves as a collector, and small amounts of other impurities. The copper is blown with air to eliminate these base impurities by oxidation, some of the copper also being oxidized. The impurities form a slag on the surface which is collected by means of cinders and skimmed off. The copper is now brought back to pitch by poling, which reduces the Cu_2O. The arsenic elimination in the Anaconda refining furnaces is small, this being almost completed in the converters.

Competition for Miners' Lamps

Under the auspices of the Acetylene Unions of the different countries, a competition for acetylene lamps for mines not containing firedamp is opened from now under the care of the International Committee of Carbide of Calcium, at Geneva (*Min. Journ.*, Oct. 26, 1912). The prize or prizes will be awarded to the lamp or lamps which most completely fulfill the following conditions: Simplicity and regularity; cheapness; strength and lightness; easiness of upkeep; convenience in cleaning and refilling; resistance to upset; ease of handling and capability of being carried in the hand or being hung on the walls; solid material, light, durable and unaffected by dampness or the results of the decomposition of the carbide; strong burner of long duration, and placed or arranged so as to avoid extinction from dripping water or by mine violences; production of gas as constant as possible, rational generation from the point of view of purity of the gas as well as the yield of the carbide; utilization of the present sizes of carbide intensity of 5 to 10 cp. as far as possible; duration of charge as long as possible.

The competition will be divided into two categories: (1) Portable lamps for carrying by hand, duration of charge eight to 12 hours; (2) portable lamps for carrying on the forehead, of extreme lightness, and a duration of at least four to five hours. At the discretion of the jury either one or two prizes may be awarded, of a total of 5000 fr., which may be granted if two prizes are awarded, 3000 fr. for the best portable lamps for the hand, and 2000 fr. for the best portable lamps for the forehead. The models, with description, price of resale, etc., must be forwarded before Mar. 20, 1913, to the International Committee of Carbide of Calcium, 5 Rue des Granges, Geneva. The jury will be composed of competent delegates from the different countries nominated by the respective Acetylene Unions.

Standard for Commercial Platinum

A committee appointed by the National Jewelers' Board of Trade, met, on Sept. 27, 1912, to consider the question of the marking of platinum (*Keystone*, October, 1912). After a long session regarding a definite standard for commercial platinum which would hold in law, the conclusion was reached that commercial platinum must be 950 fine, considering only metals of the platinum group, of which 950 parts, 65% must be platinum. Of the remaining 35% not more than 30% of any one metal of the platinum group must appear. The remaining 5% was allowed for all other metals of the group. [It is unlikely that any loosely drawn specifications of this sort will be adopted by anybody except the jewelers. Platinum ware made according to such specifications as these could not be counted on for any sort of laboratory service.—Editor.]

Hydraulicking Frozen Gravels in Yukon

By Henry Mace Payne*

Large areas of the Yukon goldfield are frozen to a depth which is as yet undetermined and drill holes which have been put down to a depth of over 200 ft. have produced cores of frozen material. This prehistoric frost necessitates thawing the gold-bearing gravel before it is possible to proceed with dredging. The hydraulic operations, however, do not require preliminary thawing, as the great force of the water issuing from the monitors tears the frozen gravel from the bank and washes it into the sluice boxes, over the riffles where the gold is caught, and the gravel passed on down, forming the immense tailing piles. It is found that by allowing water from small monitors, under pressure, to play over the top of the gravel bank, and trickle down the face, more or less thawing takes place on the surface. Advantage is also taken of the heating effect of the sun, during the open season, and the hills are cut away so as to expose the open face to its full rays.

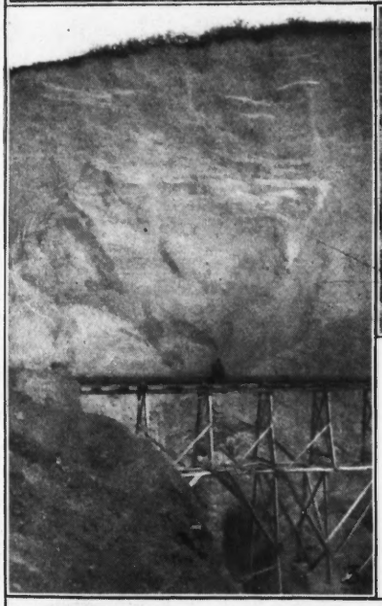
The question of obtaining suitable timber for both thawing and cribbing purposes is rapidly becoming a serious one. The mountain slopes which were once heavily wooded are now denuded and the timber used in all classes of mining operations is rafted from far up the Klondyke and Stewart Rivers. Last summer's forest fires on the Upper Yukon also destroyed valuable timber for over 100 miles along its banks.

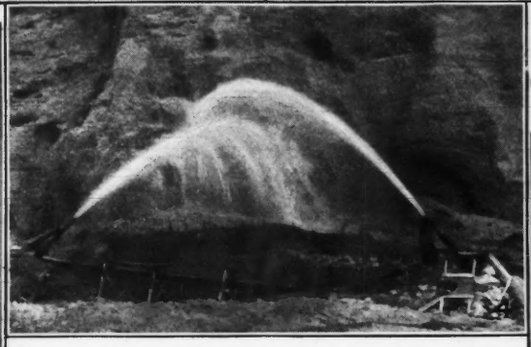
Quartz operations are rare in the district. There are a few companies following up promising leads, but no quartz field of any magnitude has as yet come to light. Last summer the Canadian government sent two quartz-mining experts to Dawson, to investigate the possibilities of the Yukon Territory for this type mining. Their report and possibly the erection of a testing mill at Dawson, will determine largely the future development of roads and public utilities under governmental supervision.

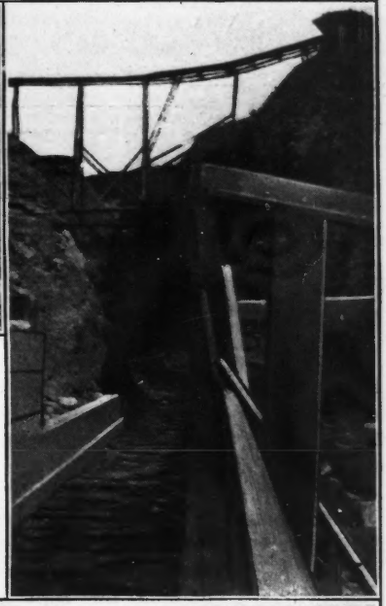
*Mining engineer, Stephen T. Williams & Staff, 346 Broadway, New York.

Photographs from the Field

Hydraulicking On Bonanza Creek, Yukon Territory







1 and 2. A 4-in. giant with water at 125-lb. pressure attacking frozen gravel forming the mountain side

3. View showing height of gravel bank and trestle carrying pipe line

4. Hydraulicking the frozen gravel with water brought from another watershed through a pipe line 60 miles long

5. Main sluice box, showing riffles of 12-in. cubes of wood, set on end

6 and 7. The creek bottom was first dredged and the wagon road established on dredge tailings; to the right is a nearer view of the extensive cribbing used in protecting the wagon road from the hydraulic tailings; the telephone poles have been reset three times

New Type of Wisconsin Zinc Deposit

By G. H. Cox*

In the early days of the Wisconsin district when galena was the chief ore, the characteristic occurrence was in "crevices" and "openings." At present sphalerite is the principal ore; it is found typically in "flats" and "pitches." Recently a new type of flats-and-pitches deposit was distinguished, called the "single pitch." It differs from the ordinary type in shape, occurrence and direction of pitch.

*Professor of geology and mineralogy, Missouri School of Mines and Metallurgy, Rolla, Mo.

Orebodies occurring in "openings," "crevices," "flats" and "pitches," and, to some extent, in disseminated deposits have long been recognized as the type deposits of the Wisconsin district. Of these, the occurrence of the ore in crevices or major fractures and cave-like openings was characteristic of the early days of the district when galena was the chief ore and the mining was confined to shallow depths.

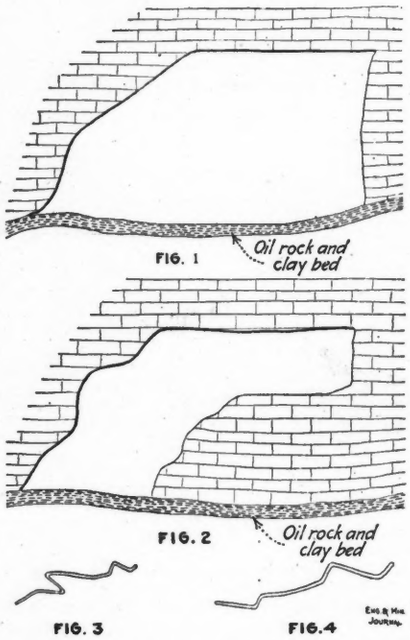
Flats and Pitches, Typical Deposit

Today, when the mining is carried on at lower levels, being practically all confined to the lower 50 ft. of the ore-bearing formation (the Galena dolomite), and sphalerite is the chief ore, flats and pitches are recognized as the main type deposit of the district. Deposits of this nature result from ore filling such fractures as would result if a portion of the dolomite, relieved of its support, broke in the form of a natural arch, and slumped. The "core ground" (that portion of the rock which slumped) is generally a number of hundred feet long, from 100 to 200 ft. wide, and surrounded on all sides by an outwardly pitching crevice which arches or "flats" over the top. The fractures and openings developed across the strata and along the bedding planes in this portion of the rock by the slump and later enlarged by solution become, when mineralized, minor flats and pitches.

Openings Were Caused by Slump

Bain[1] was apparently the first to recognize that these openings were caused by slump. He found that their occurrence was limited largely to structural basins and therefore concluded that during the deposition of the oil rock (a thin layer of organic shale at the base of the chief ore-bearing formation) from the sea it accumulated thicker in these basins than elsewhere, and that therefore the slump resulting from the decomposition of this organic matter would be greater at these points; thus accounting for both the formation of the flats and pitches and their occurrence in the structural basins.

However, it has since been suggested[2] that solution by underground water has probably been the most important factor in causing this slump and that the size of the openings themselves is largely due to farther solution along the resulting fractures. Naturally a great many variations in the shape, size, richness, etc. of these deposits occur as would be expected from varying conditions.



Sections of New Type of Zinc Deposit in Wisconsin

All horizontal or pitching sheets of ore do not belong to the typical flats and pitches described above. Much confusion has resulted from this fact and money has been uselessly lost in looking for a second pitch where none should have been expected. Bedding planes may be locally enlarged by solution while vertical and pitching crevices or major joints cross the area in various directions and which may occur at any structural position. Many of these are small freak deposits although some may belong to the class now to be described.

Single Pitch Deposit New Type

In the last few years a new type of a flats-and-pitches deposit has been developed. While at first glance it is rather similar to the ordinary type, it is in reality much different and might be more correctly known as the "single-pitch" deposit. Fig. 1 is a cross section of a deposit after the ore was removed; core ground all mineralized. Fig. 2 is another section after the ore was removed in which the core ground was but partly mineralized. These deposits differ from the ordinary type: (1) By having in general but one pitch; (2) by occurring in any structural position, but typically on the sides of the main oil-rock basins; (3) by being narrow, usually 30 to 100 ft., 50 ft. being a fair average; and (4) by their great length, the maximum of which has not yet been determined but which is greater than a mile. The two best examples of this type of deposit are the Empire mine at Platteville and the Klar-Piquette mine about 4½ miles southwest of that point. In neither of these mines has either end of the deposit been fully determined although the Empire orebody (including the Enterprise mine) has been outlined for about 5000 ft. and that of the Klar-Piquette for about 4000 feet.

Such orebodies are limited on one side by a well defined pitch near which the best ore is usually found, and on the other side by a tight vertical crevice, a trace of a pitch, or by a gradual leaning out of the ore. While these deposits are found on the sides of the main oil-rock basins, the longer dimensions of which they tend to parallel, they usually occur in minor basins, or rather troughs, about 100 ft. wide with the oil-rock raising only five to 10 ft. above the bottom of the trough on the side toward the main oil-rock basin.

Throughout the greater portion of their course these deposits seem to be connected with the surface by vertical fractures, which, however, do not appear always to be present. From the standpoint of origin it seems probable that while the presence of a long crevice in the dolomite and a small trough or roll in the oil-rock would aid greatly in the formation of a deposit of this nature, neither is necessary, for if water can flow along a crevice without the presence of a structural trough and continue its course beyond the limit of the fracture, ore deposits can be formed in these positions.

If we consider the ore to have been derived from above[3] and carried

[1]H. Foster Bain, "Zinc and Lead Deposits of the Upper Mississippi Valley, Bull. U. S. Geol. Surv. No. 294.

[2]G. H. Cox, Report on the lead and zinc deposits of northwestern Illinois, now in course of publication by the Illinois State Geological Survey.

[3]G. H. Cox, "The Origin of the Lead and Zinc Deposits of the Upper Mississippi Valley District," Economic Geology, August, 1911.

by ordinary surface water, the study of the situation of ore deposits here becomes the study of the underground-water circulation. In general this water tends to flow down the slope of the impervious oil-rock bed into the structural basins and then in the directions in which the basins pitch. Water from the surface containing ore in solution after having entered a crevice would tend to follow that crevice until another more open or extending more nearly in the desired direction was encountered. The water may be considered as passing from crevice to crevice, thus forming those sharp elbow-like turns which are so characteristic of these single-pitch deposits.

Deposits Distinguished By Shape, Occurrence and Direction of Pitch

It is to be noted that in following down one of these deposits the turn is always towards the main oil-rock basin, the prevailing direction of the deposit changing from oblique to parallel to the strike of the basin as the deposit approaches the bottom of the depression. While most of the water follows the crevice, a small portion is always seeking a more direct route and slowly finds its way along the joints and bedding planes on the drainage side of the crevice or water course. Solution accompanying this slow flow of water finally results in slump, but on this side of the crevice only. When this is accompanied or followed by the deposition of ore, there results a long, narrow, single-pitch deposit marked by sharp elbow-like turns as shown in Figs. 3 and 4. Fig. 3 is a horizontal section of the Klar-Piquette orebody on the scale 4.: 1 mile; Fig. 4 is a similar section of the Empire orebody on the same scale.

It is thus seen that these deposits should not be confused with those of the so called flats and pitches and are to be distinguished from them by their shape and occurrence, but probably most readily by the fact that these pitches tend to pitch in the direction of the main oil-rock slope, while in the other case the pitch is in the opposite direction.

These Deposits Narrow

These deposits are hard to find by drilling because of their extreme narrowness, and great care should be exercised in following such an orebody because of the necessity of determining its probable course so that the desired leases may be obtained, and because lean portions may be encountered which might otherwise be considered as the end of the deposit. The discovery of this class of deposits has greatly increased the attractiveness of the district and has shown that the possibilities of the district are much larger than heretofore supposed.

Lead Poisoning in Factories

Washington Correspondence

The Bureau of Labor has just completed a study of lead poisoning in potteries, tile works and porcelain enameled sanitary ware factories, etc. The investigation covered the conditions in 68 establishments, employing 2100 men and 400 women, and was carried on by Dr. A. Hamilton.

Extent of Lead Poisoning

Among the 1100 men employed in the potteries and tile works investigated, Doctor Hamilton found 87 cases of lead poisoning occurring in 1911, or one for every 12 or 13 employed, and among the 393 women 57 cases, or one for every seven employed. Among the 1012 men engaged in the porcelain enameling of iron sanitary ware 187 cases of lead poisoning were found in 1911, or one for every five employed.

The degree of danger involved in the various processes depends partly on the amount of lead used in the glazes and partly on the use or neglect of methods and devices for protecting the workers. In the 40 white-ware potteries visited, the glazes used contained from 1.75 to 33.3% white lead. In the seven potteries making art and utility ware and in the 11 tile factories the glazes contained from 5 to 60% of white lead. In the 10 porcelain enameled sanitary-ware factories, enamels are in use containing from 2 to 25% of lead.

Prevention of Lead Poisoning

The precautions which should be used in establishments using these lead glazes are indicated by the nature of the danger. Lead is a slowly cumulative poison which enters the human system chiefly through the digestive tract. The mucus membrane of the respiratory tract may absorb lead, and lead has also been found to penetrate the blood vessels of the lungs and so to reach the general circulation. The greater part of the lead which is breathed in as dust is swallowed with the saliva, thus reaching the stomach, and this is the most frequent mode of poisoning by lead. Next in importance comes poisoning by lead which is carried into the mouth with food or chewing tobacco which has been handled with lead-covered fingers, or left exposed in a room where there was lead dust, or carried in the pockets of dusty clothes. Absorption of lead through the unbroken skin is probably a negligible amount.

The prevention of lead poisoning in a factory in which lead glazes are used depends upon measures to prevent dust so that the workmen need not breathe in lead, and measures to provide for personal cleanliness so that he will not convey lead into his mouth from his fingers or carry it home on his body or clothes.

Absence of Protective Measures

Preventive measures of both kinds were conspicuously absent in the factories investigated. Generally speaking, no effort was made to keep down the amount of dust, and no provision was made for carrying it off by exhausts or other mechanical devices. Processes which involve no dust were carried on in the same rooms with dusty ones, exposing workers in the first to a wholly unnecessary danger. The construction of the floors and the methods of cleaning added to the risk. Hot water, an absolute necessity for removing the lead from the hands before eating, was furnished in but a few instances, and soap and towels not at all. Lunch rooms were not provided, and in many instances workers ate wherever they could find a place, regardless of whether or not lead dust was thick about them. No medical care was given the employees except when one of them was taken violently ill while at work in the factory.

Radioactive Waters in the Caucasus

A correspondent of the London *Mining Journal* says that in the summer of the current year the Odessa section of the Imperial Russian Technical Society sent a special expedition to the Caucasus to investigate the radioactive rocks and waters there. The expedition investigated the radioactivity of the sulphur wells in Tiflis, the alkaline carbonic-ferrous wells of Borzhom, and also the waters of Suran. The springs of Abass-Tuman and Maxindzhaur, in the Batoum Province, were also examined. Of all these springs the most radioactive are hot sulphur ones. Judging by the degree of radioactivity of the springs, the presence of radioactive ores along the courses of the waters can hardly be assumed. The expedition did not find any rocks, where it searched, suggesting uranium or thorium ores.

Wedge's Copper-Recovery Method

The extraction in the wet way of copper from oxides, silicates and carbonates is covered by a recent patent of Utley Wedge (U. S. pat. No. 1,043,490). The ores are treated in a Wedge furnace of the muffle type, in a current of sulphur dioxide and air, or of sulphur trioxide. While the process is operative with as little as 3% of SO_2 in the gas, it is preferable to have 14 to 16%. The furnace must be maintained at 800° to 1100° F., but care must be taken not to overheat, and hence decompose, the sulphate after formation. The copper sulphate is then leached out of the sulphatized ore, and the copper precipitated as usual.

Mining and Metallurgical Patents

A Classified List of New Inventions

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

COPPER

ALLOYS—Method of Producing Alloys or Compounds of Titanium and Copper. Isador Ladoff, Cleveland, Ohio, assignor, by mesne assignments, of thirty one-hundredths to Walter D. Edmonds, Boonville, N. Y. (U. S. No. 1,042,694; Oct. 29, 1912.)

BRASS—Process for Making Brass. Lawrence Addicks, Chrome, N. J. (U. S. No. 1,041,940; Oct. 22, 1912.)

EXTRACTION—Process for the Extraction of Copper and Nickel, Particularly from Low-grade Ores and Products. Wilhelm Borchers, Aachen, Germany, and Harald Pedersen, Trondhjem, Norway. (U. S. No. 1,043,291; Nov. 5, 1912.)

LEACHING—Art of Extracting Metals from Ores. Jose Baxeres de Alzugaray, New York, N. Y., assignor, by mesne assignments, to Midland Ores & Patents Co., New York, N. Y. (U. S. No. 1,041,407; Oct. 15, 1912.)

RECOVERING COPPER from Compounds Containing the Same. Utley Wedge, Ardmore, Penn., assignor to Furnace Patent Co., Philadelphia, Penn. (U. S. No. 1,043,490; Nov. 5, 1912.)

GOLD AND SILVER

AMALGAMATING APPARATUS. Alfred Andrew Lockwood, Honor Oak, England, assignor to Turbo Amalgamator & Extraction Co., Ltd., London, England. (U. S. No. 1,043,611; Nov. 5, 1912.)

AMALGAMATOR. Frederick J. Hoyt, Redlands, Calif. (U. S. No. 1,042,229; Oct. 22, 1912.)

AMALGAMATOR. Royer Luckenbach, Colwyn, Penn., assignor to Penn Mining & Reduction Co., Camden, N. J. (U. S. No. 1,042,701; Oct. 29, 1912.)

CLASSIFYING or Grading Apparatus. G. H. Stanley, Johannesburg, Transvaal, assignor to Sands, Ltd., Johannesburg. (U. S. No. 1,039,206; Sept. 24, 1912.)

CRUSHING—Improvements in or Relating to Apparatus for Crushing and, if Required, Amalgamating Gold or Silver Ores. W. W. Wright, Pont Ruabon, Denbigh. (Brit. No. 22,323 of 1911.)

CRUSHING—Improvements in Stamp Guides for Use in Ore Reducing or Stamp Mills. E. W. Massam, Krudersdorp, Transvaal. (Brit. No. 8450 of 1912.)

CYANIDES—Production of Cyanamides and Cyanides of the Alkali Metals. Edgar Arthur Ashcroft, London, England. (U. S. No. 1,041,566; Oct. 15, 1912.)

CYANIDING — Improvements in the Treatment of Ores by the Cyanide Process. H. M. Leslie, Glasgow, Scotland. (Brit. No. 27,879 of 1911.)

CYANIDING—Process of Filtration. James Millar Neil, Toronto, Ont. (U. S. No. 1,043,455; Nov. 5, 1912.)

CYANIDING—Settling and Separating Tank. H. C. Holthoff, Mexico, Mex., assignor to Allis-Chalmers Co., Milwaukee, Wis. (U. S. No. 1,043,698; Nov. 5, 1912.)

DREDGING — Gold Saving Table. Charles B. King and Jacob W. Fellmeth, Marion, Ohio, assignors to Marion Steam Shovel Co., Marion, Ohio. (U. S. No. 1,041,486; Oct. 15, 1912.)

DRY SEPARATOR. Fritz Oscar Stromborg, Seattle, Wash. (U. S. No. 1,042,836; Oct. 29, 1912.)

FILTERING APPARATUS. Lamartine C. Trent, Los Angeles, Cal. (U. S. No. 1,042,295; Oct. 22, 1912.)

STAMP MILLING—Feeding Apparatus for Stamp Mills. Otto Durstewitz, Parral, Chihuahua, Mexico, assignor of one-half to Frank Reichmann, Chicago, Ill. (U. S. No. 1,038,733; Sept. 17, 1912.)

IRON AND STEEL

ALLOY of Iron and Titanium and Process of Producing the Same. Isador Ladoff, Cleveland, Ohio, assignor, by mesne assignments, of thirty one-hundredths to Walter D. Edmonds, Boonville, N. Y. (U. S. No. 1,040,699; Oct. 8, 1912.)

BLAST FURNACE COOLING DEVICE. Frank D. Carney, Steelton, Penn. (U. S. No. 1,042,767; Oct. 29, 1912.)

COATING—Permeating Protective for Iron and Steel Articles. Herman J. Lohmann, Jersey City, N. J., assignor to The Firm of H. J. Lohmann & Co. (U. S. No. 1,039,978; Oct. 1, 1912.)

FERRO SILICON—New or Improved Method of Producing Ferro Silicon. C. Bingham, London, Eng. (Brit. No. 22,755 of 1911.)

FLUE DUST—Treatment of Flue Dust. John I. Souther, Westmont, Penn. (U. S. No. 1,041,363; Oct. 15, 1912.)

FURNACE — Regenerative Reversing Furnace. Luther L. Knox, Avalon, Penn., assignor to Keystone Furnace Construction Co., Pittsburgh, Penn. (U. S. No. 1,041,814; Oct. 22, 1912.)

FURNACES—Improvements in or Relating to Regenerative Metallurgical Furnaces, particularly the Open Hearth Type. Thomas S. Blair, Kane, Ill. (Brit. No. 15,480 of 1912.)

HARDENING—Process of Hardening Steel Poor in Carbon. Carl Burian, Berlin, Germany, assignor to Offene Handelsgesellschaft Gebruder Schubert, Berlin, Germany. (U. S. No. 1,042,999; Oct. 29, 1912.)

MANUFACTURE of Steel. Paul Girod, Ugines, France. (U. S. No. 1,043,090; Nov. 5, 1912.)

ROASTING—Improvements in or Relating to the Roasting of Iron Ores. Coln Musener Bergwerks A. V., Creuzthal, Westphalia, Germany. (Brit. No. 20,404 of 1911.)

SLAG POCKET for Furnace. William W. Smith, Ensley, Ala. (U. S. No. 1,042,046; Oct. 22, 1912.)

SOAKING PIT. Horace E. Smythe, Pittsburgh, Penn., assignor to The S. R. Smythe Co., Pittsburgh, Penn. (U. S. No. 1,044,093; Nov. 12, 1912.)

LEAD, ZINC AND OTHER METALS

ALUMINA—Method of Manufacturing Crystalline Alumina. Frank J. Tone and Thomas B. Allen, Niagara Falls, N. Y., assignors to The Carborundum Co., Niagara Falls, N. Y. (U. S. No. 1,044,296; Nov. 12, 1912.)

ALUMINUM—Composition to Facilitate the Tapping of Aluminum or the Like. Hayden A. Kern, Dayton, Ohio. (U. S. No. 1,041,484; Oct. 15, 1912.)

ALUMINUM—Improvements in and Relating to Aluminum Alloys. W. N. Naylor, London, and S. P. Hutton, Beckenham Kent, Eng. (Brit. No. 27,382 of 1911.)

ALUMINUM—Process of Manufacturing Sodic Silico Aluminate and Hydrochloric Acid. Alfred H. Cowles, Lockport, N. Y., assignor to Electric Smelting & Aluminum Company, Lockport, N. Y. (U. S. Nos. 1,041,598 and 1,041,599; Oct. 15, 1912.)

ALUMINUM—Process of Producing Ammonia and Aluminum Compounds. Carl Bosch and Alwin Mittasch, Ludwigshafen on the Rhine, Germany, assignors to Badische Anilin & Soda Fabrik, Ludwigshafen on the Rhine, Germany. (U. S. No. 1,043,798; Nov. 12, 1912.)

ALUMINUM—Tunnel Furnace for Making Hydrochloric Acid. Alfred H. Cowles, Sewaren, N. J., assignor to Electric Smelting & Aluminum Co., Sewaren, N. J. (U. S. No. 1,040,978; Oct. 8, 1912.)

LEAD—Process for the Manufacture of Metallic Lead from Lead Compounds. G. Jansen, Dusseldorf, Germany. (Brit. No. 3728 of 1912.)

NICKEL—Process for the Extraction of Copper and Nickel, particularly from Low-grade Ores and Products. Wilhelm Borchers, Aachen, Germany, and Harald Pedersen, Trondhjen, Norway. (U. S. No. 1,043,291; Nov. 5, 1912.)

NICKEL—Process of Extracting Nickel. Horace L. Wells, New Haven, Conn., assignor of two-thirds to Mary H. King, East Orange, N. J. (U. S. No. 1,044,316; Nov. 12, 1912.)

NICKEL—Process of Making Nickel Salts and Recovering the Acid Used. Horace L. Wells, New Haven, Conn., assignor of two-thirds to Mary H. King, East Orange, N. J. (U. S. No. 1,039,861; Oct. 1, 1912.)

PLATINUM—Clad Metals and Process of Making Same. Byron E. Eldred, Bronxville, N. Y. (U. S. No. 1,043,576; Nov. 5, 1912.)

PLATINUM—Compound Metal Body and Process of Making the Same. Byron E. Eldred, Bronxville, N. Y., assignor to Commercial Research Co., New York, N. Y. (U. S. No. 1,043,578; Nov. 5, 1912.)

PLATINUM—Method of and Apparatus for Producing Compound Metal Objects. Byron E. Eldred, Bronxville, N. Y., assignor to Commercial Research Co., New York, (U. S. No. 1,043,577; Nov. 5, 1912.)

TIN—Process of Making Anhydrous Tetrachlorid of Tin From Dioxide of Tin. Fritz Braunlich, Brunn. Austria-Hungary. (U. S. No. 1,039;356; Sept. 24, 1912.)

TIN—Process of Purifying Alkali Stannates. Gustav Spitz, Brunn,, Austria-Hungary, assignor to Goldschmidt Detinning Co., New York, N. Y. (U. S. No. 1,041,895; Oct. 22, 1912.)

ZINC—Improvements in the Production of Zinc and Other Metals of a Similar Nature. Heinrich Specketer, Griesheim-on-the-Main, Germany. (Brit. No. 10,349 of 1912.)

ZINC-LEAD-ORE TREATMENT—Process for the Treatment of Refractory Zinc-Lead Ores. Andrew Gordon French, Nelson, B. C. (U. S. No. 1,041,060; Oct. 15, 1912.)

ZINC RECOVERY from Galvanized-Iron Articles. Eduard Broemme, St. Petersburg, Russia, and Rudolf Steinau, Nuremberg, Germany. (U. S. No. 1,042,315; Oct. 22, 1912.)

ZINC RETORT-FURNACE. Charles A. H. de Saulles, Gas, Kan., assignor to New Jersey Zinc Co., New York, N. Y. (U. S. No. 1,041,977; Oct. 22, 1912.)

NON-METALLIC MINERALS

BARYTES—Process of Making Precipitated Barium Sulphate. John P. Walker, Rolla, Mo. (U. S. No. 1,040,594; Oct. 8, 1912.)

BARYTES—Process of Obtaining Porous and Fairly-Pure Barium Oxide from Barium Carbonate. Karl Bornemann, Aix-la-Chapelle, Germany, assignor to Chemische Fabrik Coswig-Anhalt, G. M. B. H., Coswig-Anhalt, Germany. (U. S. No. 1,041,583; Oct. 15, 1912.)

FELDSPAR—Process of Treating Feldspar for Potash. Harry W. Morse and Ledyard W. Sargent, Cambridge, Mass. (U. S. No. 1,041,327; Oct. 15, 1912.)

PHOSPHATE—Fertilizer and Process of Making Same. Spencer B. Newberry and Harvey N. Barrett, Baybridge, Ohio. (U. S. No. 1,042,588; Oct. 29, 1912.)

MINING—GENERAL

ACETYLENE CANDLE. Ralph R. Arnold, Cripple Creek, Colo. (U. S. No. 1,043,039; Oct. 29, 1912.)

BLASTING—Method for the Detonation of Explosives. Heinrich Brunswig, Steglitz, near Berlin, Germany, assignor to E. I. du Pont de Nemours Powder Co., Wilmington, Del. (U. S. No. 1,042,643; Oct. 29, 1912.)

DRILL. John A. Pease, Gypsum, Kan. (U. S. No. 1,042,597; Oct. 29, 1912.)

DRILL—Diamond Drill. Franz Bade, Peine, Germany. (U. S. No. 1,041,568; Oct. 15, 1912.)

DRILL—Electric Drill. Walter J. Bauroth, Columbus, Ohio, assignor to The

Jeffrey Manufacturing Co. (U. S. No. 1,044,338; Nov. 12, 1912.)

DRILL—Mining-Drill Chuck. John L. Dabadie, Stockton, Cal., assignor of one-half to Columbo Boitano, Stockton, Calif. (U. S. No. 1,044,029; Nov. 12, 1912.)

DRILL—Motive-Fluid-Operated Tool. Daniel Shaw Waugh, Denver, Colo., assignor to Denver Rock Drill & Machinery Co., Denver, Colo. (U. S. No. 1,042,512; Oct. 29, 1912.)

DRILL — Percussion-Tool Machine. Franz Bade, Peine, Germany. (U. S. No. 1,041,569; Oct. 15, 1912.)

DRILL—Rock Drill. Charles A. Hultquist, Los Angeles, Calif. (U. S. No. 1,040,544; Oct. 8, 1912.)

DRILL—Rock Drill. Edwin M. Mackie, Chicago, Ill., and Percival F. Doyle, Franklin, Penn., assignors to Chicago Pneumatic Tool Co., Chicago, Ill. (U. S. No. 1,042,359; Oct. 22, 1912.)

DRILL — Rock Drill. Henry Deitz, Denver, Colo. (U. S. No. 1,043,302; Nov. 5, 1912.)

DRILL—Rock Drill. Thomas J. Barbre and James G. Trefz, Denver, Colo., assignors to Western Machinery & Manufacturing Co. (U. S. No. 1,044,337; Nov. 12, 1912.)

DRILL BIT. Robert A. Welch, Dover, N. J. (U. S. No. 1,043,855; Nov. 12, 1912.)

DRILL EXTRACTOR. Benjamin F. Betts, Mazuma, Nev. (U. S. No. 1,042,873; Oct. 29, 1912.)

DRILLING—Improvements in and Relating to Machines and Appliances for Boring Rock, Coal and the Like. S. Buckley and H. Smith, Sheffield, Eng. (Brit. No. 21,433 of 1911.)

DRILLING—Improvements in and Relating to Tools for Boring Earth and Soft Rocks. A. Wolf, Liegnitz, Germany. (Brit. No. 19,462 of 1911.)

DRILLS—Improvements in and Relating to Percussive Rock Drills. John Drunnan, Sheffield, Eng. (Brit. No. 7085 of 1912.)

DRILLS—Improvements in and Relating to Rock Drills. M. A. Knapp, Oakland, Calif. (Brit. No. 21,257 of 1911.)

DRILLS—Improvements in Valve Apparatus for Percussive Rock Drills, Tools and the Like. G. Rayner, Sheffield, Eng. (Brit. No. 5549 of 1912.)

DRILLS—Improvements Relating to Rock Drills. G. Rayner, Sheffield, Eng. (Brit. No. 23,103 of 1911.)

DRILLS—Improvements Relating to Rock Drills and Like Percussive Tools. G. Rayner, Sheffield, Eng. (Brit. No. 13,657 of 1912.)

EXCAVATING—Automatic Electric Excavating Bucket. Walter G. Stephan, Cleveland, and Clement E. Beard, Columbiana, Ohio. (U. S. No. 1,043,640; Nov. 5, 1912.)

EXCAVATING MACHINE. Franklin J. Dearborn, Oakland, Calif. (U. S. No. 1,041,603; Oct. 14, 1912.)

EXCAVATING MACHINE. Leo Albert Krupp, Carey, Ohio, assignor of one half to Peat Industries, Ltd., Montreal, Canada. (U. S. No. 1,043,113; Nov. 5, 1912.)

FLUME—Trough or Open Flume. William Lennon, Manitou, Colo. (U. S. No. 1,042,239; Oct. 22, 1912.)

MINE CAR BRAKE. David W. Anderson and William M. Boyce, Clearfield, and Frederick W. Hollopeter, Glenhope, Penn. (U. S. No. 1,043,498; Nov. 5, 1912.)

MINING METHOD—Method of Getting Clay, Chalk, or the Like, Applicable also to the Working of Mines or Making of Railway Cuttings. Robert Beart Lucas, Hitchin, England. (U. S. No. 1,043,784; Nov. 5, 1912.)

ORE BIN DOOR. Oliver H. Dickerson, Duluth, Minn. (U. S. No. 1,041,444; Oct. 15, 1912.)

RESCUE WORK—Method of Causing Artificial Respiration. Johann Heinrich Draeger, Lubeck, Germany. (U. S. No. 1,044,031; Nov. 12, 1912.)

ROPE WINDING ENGINE. Harry N. Covell, New York, N. Y., assignor to Lidgerwood Manufacturing Co., New York, N. Y. (U. S. No. 1,042,090; Oct. 22, 1912.)

TUNNELING—Shaft Boring and Tunneling Machine. William F. Wittich, Erie, Penn. (U. S. No. 1,043,185; Nov. 5, 1912.)

TUNNELING MACHINE. Lebbeus H. Rogers, New York, N. Y., assignor to Case Tunnel & Engineering Co. (U. S. No. 1,039,809; Oct. 1, 1912.)

WATER MEASUREMENT—Miner's Inch Weir. William F. Englebright, Nevada City, Calif. (U. S. No. 1,042,097; Oct. 22, 1912.)

WIRE ROPE HOOK DEVICE. Nels O. Norell, Vancouver, B. C. (U. S. No. 1,043,064; Nov. 12, 1912.)

ORE-DRESSING—GENERAL

CONCENTRATOR. Arthur R. Wilfley, Denver, Colo. (U. S. No. 1,043,280; Nov. 5, 1912.)

CONCENTRATOR—Ore Concentrator. Clarence I. Glassbrook, Salt Lake City, Utah. (U. S. No. 1,038,871; Sept. 17, 1912.)

CONCENTRATOR—Ore Concentrator. Emil Deister, Fort Wayne, Ind., assignor to the Deister Concentrator Co., Fort Wayne, Ind. (U. S. No. 1,040,288; Oct. 8, 1912, and 1,044,030, Nov. 12, 1912.)

CONCENTRATOR—Ore Concentrator or Slimer. Ira Monell, Boulder, Colo. (U. S. No. 1,041,842; Oct. 22, 1912.)

CLASSIFIER. Lamartine C. Trent, Los Angeles, Calif. (U. S. No. 1,041,909; Oct. 22, 1912.)

CRUSHER and Pulverizer. Frank L. Buchanan, St. Louis, Mo., assignor of one-half to Charles F. Johnson and one-half to George Bridges, St. Louis, Mo. (U. S. No. 1,044,441; Nov. 12, 1912.)

CRUSHER—Rock and Ore Crusher. Theodor Willma, Milwaukee, Wis., assignor of one-eighth to Martin Walski and one-eighth to Stanislaw Kielar, Milwaukee, Wis. (U. S. No. 1,044,325; Nov. 12, 1912.)

CRUSHING—Apparatus for Grinding Ores and Other Materials. Harry W. Hardinge, New York, N. Y., assignor to Hardinge Conical Mill Co., New York, N. Y. (U. S. No. 1,041,783; Oct. 22, 1912.)

CRUSHING—Ball Mill. Heinrich Ostwald, Cologne, Germany. (U. S. No. 1,043,349; Nov. 5, 1912.)

CRUSHING—Improvements in Crushing Machines. J. E. Simons, Milwaukee, Wis. (Brit. No. 599 of 1912.)

CRUSHING—Improvements in Crushing Mills. T. J. Sturtevant, Wellesley, Mass. (Brit. No. 14,832 of 1912.)

CRUSHING—Improvements in or Relating to Breaking and Crushing Apparatus. E. Friedrich, Leipzig-Plagwitz, Germany. (Brit. No. 11,238 of 1912.)

CRUSHING—Improvements in or Relating to Crushing, Pulverizing or Disintegrating Machines. R. Emmott, Burnley. (Brit. No. 22,097 of 1911.)

CRUSHING—Improvements in Pneumatic Stamps for Crushing Ore and the Like. J. M. Holman and J. L. Holman, Camborne, Cornwall, Eng. (Brit. No. 27,273 of 1911.)

CRUSHING—Tube Mill Grinder. William Main, Piermont, N. Y. (U. S. No. 1,043,855; Nov. 12, 1912.)

MAGNETIC SEPARATION—Improved Process for the Magnetic Preparation or Oiling of Ores or the Like and Apparatus Therefor. Murex Magnetic Co., Ltd., and A. A. Lockwood, London, Eng. (Brit. No. 25,469 of 1911.)

ORE SCREEN. Charles O. Michaelsen, Omaha, Neb. (U. S. No. 1,040,251; Oct. 1, 1912.)

PULVERIZER. Frederick R. Cornwall, St. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Co., St. Louis, Mo. (U. S. No. 1,039,102; Sept. 24, 1912.)

PULVERIZER. William K. Liggett and Walter J. Armstrong, Columbus, Ohio, assignors to Jeffrey Manufacturing Co. (U. S. No. 1,041,495; Oct. 15, 1912.)

SEPARATOR—Ore Separator. William F. Bradbury, Kansas City, Mo.; Emma Bradbury administratrix of said William F. Bradbury, deceased. (U. S. No. 1,042,194; Oct. 22, 1912.)

SIZING—Machine for Sizing and Separating Granular Material. Benjamin A. Hughes, Colorado Springs, Colo. (U. S. No. 1,039,132; Sept. 24, 1912.)

SIZING—Method and Apparatus for Sizing or Volumetric Grading of Materials. Charles L. McKesson and Benjamin F. Rice, Colorado Springs, Colo. (U. S. No. 1,044,067; Nov. 12, 1912.)

SLIME CONCENTRATOR. William F. Deister. Fort Wayne, Ind. (U. S. No. 1,037,212; Sept. 3, 1912.)

METALLURGY—GENERAL

ALLOYS — Production of Alloys. Charles A. Hansen, Schenectady, N. Y., assignor to General Electric Co. (U. S. No. 1,041,072; Oct. 15, 1912.)

CASTING of Metals. Augustin Leon Jean Queneau, Philadelphia, Penn., assignor to Wetherill Finished Castings Co., Philadelphia, Penn. (U. S. No. 1,043,867; Nov. 12, 1912.)

CATALYTIC BODY. Byron E. Eldred, Bronxville, N. Y., assignor to the Commercial Research Co., New York, N. Y. (U. S. No. 1,043,580; Nov. 5, 1912.)

CHANNEL FURNACE. Nils V. Hansell, Bloomfield, N. J., assignor to American Grondal Co., New York, N. Y. (U. S. No. 1,043,695; Nov. 5, 1912.)

CHEMICAL APPARATUS for the Evaporation of Corrosive Liquids. Byron E. Eldred, Bronxville, N. Y., assignor to Commercial Research Co., New York, N. Y. (U. S. No. 1,043,581; Nov. 5, 1912.)

CHEMICAL VESSEL for Withstanding High Temperatures. Byron E. Eldred, Bronxville, N. Y., assignor to Commercial Research Co., New York, N. Y. (U. S. No. 1,043,579; Nov. 5, 1912.)

CONVERTER. Alexander F. Stirling Blackwood, Detroit, Mich. (U. S. No. 1,042,876; Oct. 29, 1912.)

CRUCIBLE FURNACE. Walter S. Rockwell, Jersey City, N. J., assignor to W. S. Rockwell Co., New York, N. Y. (U. S. No. 1,042,825; Oct. 29, 1912.)

ELECTRIC FURNACE. John A. Seede, Schenectady, N. Y., assignor to General Electric Co. (U. S. No. 1,042,613; Oct. 29, 1912.)

ELECTRIC FURNACES — Improvements in Electric Furnaces. A. L. J. Queneau, Philadelphia, Penn. (Brit. No. 19,305 of 1911.)

ELECTROLYTIC APPARATUS. William E. Greenawalt, Denver, Colo. (U. S. No. 1,043,096; Nov. 5, 1912.)

FURNACE LINING—Refractory Material. Frank J. Tone, Niagara Falls, N. Y., assignor to Carborundum Co., Niagara Falls, N. Y. (U. S. No. 1,042,844; Oct. 29, 1912.)

AUTOMATIC SAFETY DEVICE FOR ELEVATORS. Peter Hinkel, Ashland, Ky. (U. S. No. 1,043,833; Nov. 12, 1912.)

FURNACE SKIPS—Automatic Safety Device for Furnace Skips or Elevators. Peter Hinkel, Ashland, Ky. (U. S. No. 1,043,834; Nov. 12, 1912.)

GAS PRODUCER. Charles A. Kuenzel, Buena Vista, Colo., assignor to Kuenzel Gas Producer & Smelter Construction Co. (U. S. No. 1,042,566; Oct. 29, 1912.)

KILN—Burner for Rotary Kilns, etc. Povl T. Lindhard, New York, N. Y., assignor to F. L. Smidth & Co., New York, N. Y. (U. S. No. 1,042,576; Oct. 29, 1912.)

KILNS—Heat Regenerator for Cement Kilns. Bruno Bruhn, Charlottenburg, Germany, assignor to The Commercial Research Co., New York, N. Y. (U. S. No. 1,043,901; Nov. 12, 1912.)

LIGHT METALS—Electrolytic Production of Light Metals. George O. Seward, East Orange, N. J., and Franz von Kugelgen and Fritz von Bidder, Holcombs Rock, Va., assignors to Virginia Laboratory Co., New York, N. Y. (U. S. No. 1,043,154; Nov. 5, 1912.)

LIQUID FUEL—Process for Producing Combustible Gas. Charles A. Kuenzel, Buena Vista, Colo., assignor to Kuenzel Gas Producer & Smelter Construction Co. (U. S. No. 1,042,567; Oct. 29, 1912.)

MELTING FURNACE—Electric Melting Furnace. Wayne D. Ludwick, near Tacoma, Wash., assignor of fifty-one one-hundredths to Henry Hewitt, Jr., Tacoma, Wash. (U. S. No. 1,038,614; Sept. 17, 1912.)

ORE TREATMENT—Improvements in or Relating to the Treatment of Ores. N. H. M. Dekker, Paris, France. (Brit. No. 18,488 of 1911.)

POROUS METALS—Method for Producing So-Called Porous Metals. Harald Immanuel Hannover, Copenhagen, Denmark. (U. S. No. 1,042,111; Oct. 22, 1912.)

PURIFICATION—Method of Purifying Metals. Axel Gustaf Sundberg, Helsingborg, Sweden, assignor to Helsingborgs Kopparverks Aktiebolag, Helsingborg, Sweden. (U. S. No. 1,043,371; Nov. 5, 1912.)

PURIFICATION—Process for Purification of Metals. William H. Kelly, Los Angeles, Calif. (U. S. No. 1,041,801; Oct. 22, 1912.)

REGENERATIVE FURNACE. William Frederick Taylor, Tacoma, Wash. (U. S. No. 1,040,459; Oct. 8, 1912.)

ROASTING—Treating Furnace Gases. Utley Wedge, Ardmore, Penn. (U. S. No. 1,039,464; Sept. 24, 1912.)

SCREEN—Rotary Screen. George H. Worrall, Kirkwood, Mo., assignor to National Lead Co., St. Louis, Mo. (U. S. No. 1,041,935; Oct. 22, 1912.)

SMELTER SMOKE—Fume Arrester for Regenerative Matting Furnaces. William Frederick Taylor, Tacoma, Wash. (U. S. No. 1,040,460; Oct. 8, 1912.)

PERSONALS

Mining and metallurgical engineers are invited to keep The Engineering and Mining Journal informed of their movements and appointments.

There is a vacancy in a junior position on the editorial staff of the JOURNAL. Applicants are requested to call in person

William T. Soule, superintendent of the Valdez Creek placer mines, Alaska, is in Boston.

D. W. Jessup has been appointed superintendent of the Home Run Copper Co., at Pioche, Nevada.

C. C. Greenwood, superintendent of the Camelia mine, Pachuca, Mex., has been visiting New York.

James A. Ford, of Denver, recently examined some mining property in the Georgetown district in Colorado.

Donald Steel has returned to California after two years spent in the Belgian Congo for the Société International Forestière et Minière du Congo.

L. R. Lemoine, president of the United States Cast Iron Pipe & Foundry Co., New York, has returned from Europe.

W. L. Fleming, of New York, has gone to Porcupine and Cobalt, Ont., to inspect the holdings of C. L. Sherrill and associates.

Effingham B. Morris, chairman of the board of the Cambria Steel Co., has been made a director of the United Gas Improvement Co., of Philadelphia.

Louis Lorent, superintendent of the Santa Eduviges mine, Sonora, Mexico, is in Trenton, N. J., where he will remain awaiting a cessation of hostilities in Mexico.

Arthur W. Prausnitz, associate Pacific Coast manager for the Orenstein-Arthur Koppel Co., is on his way to Europe to make arrangements for enlarging the company's business on the coast.

Rupert Swinnerton has been elected president of the Hibuna Land & Iron Co., Hibbing, Minn. The company, which was recently incorporated, controls nearly 1000 acres of mineral land on the Cuyuna range.

William M. Fink, superintendent of the San Toy Mining Co., near Chihuahua, was being held for $5000 ransom by the rebel bands which captured Santa Eulalia, according to news received by the Department of State on Nov. 22.

President J. A. Farrell and Controller W. J. Filbert, of the United States Steel Corporation, and Eugene P. Thomas, president of the United States Steel Products Co., have returned from a tour of the Porahontas coke plants of the Steel Corporation.

E. W. Oglebay, of Oglebay, Norton & Co., Cleveland, was present at the dedication last week of the Oglebay Hall of Agriculture, Bethany College, Bethany, W. Va., which he had presented to the school. He has made numerous gifts to the college.

Walter Rachals, who has resigned from the office of Julian Kennedy to go with Westinghouse, Church, Kerr & Co., will be succeeded by W. C. Rott, lately resident engineer for Mr. Kennedy at the new plant of the Brier Hill Steel Co., Youngstown, Ohio.

J. M. Fitzgerald, formerly president of the Davis Coal & Coke Co., has been made president of the Western Maryland R.R. At one time he was assistant to the vice-president of the Virginia Iron, Coal & Coke Co. He is a member of the American Institute of Mining Engineers, and of the British Iron & Steel Institute.

R. H. Flaherty, head of the exploratory staff for the Mackenzie & Mann interests, who during the summer had charge of a large party engaged in prospecting the country on the east side of James and Hudson bays, in Ungava, has returned to Ontario. He states that the area examined is rich in minerals, but details of discoveries are withheld for the present.

Robert W. Hunt, of Chicago, widely known as the head of a prominent firm of consulting engineers, has been awarded the John Fritz medal for this year. This medal was founded in 1902 in honor of the veteran iron master whose name it bears "to commemorate notable scientific and industrial progress." Capt. Hunt was one of "John Fritz's boys." When about 20 years old he began work in the iron industry at Pottsville, Penn. Later he studied chemistry and became the chemist of the Cambria Co. He was at various times superintendent of steel works in Wyandotte, Mich., Johnstown, Penn., and Troy, N. Y. In 1888 he founded the firm of R. W. Hunt & Co., consulting engineers, inspectors, etc. He served in the Civil War from 1861 to 1865, rising from private to captain. The previous awards of this medal, besides the initial presentation to Mr. Fritz, have been to Lord Kelvin, George Westinghouse, Alexander Graham Bell, Thomas A. Edison, Charles T. Porter, Alfred Noble and Sir William White.

OBITUARY

Thomas Quirk, for many years prominent as a mining man in Butte, Mont., died at San Antonio, Tex., Nov. 7. He left Butte seven years ago on account of his health and since then had resided in Texas and Mexico. He was born in the Isle of Man, in 1856, and when a young man came to the United States. He was generally credited with the discovery of the Esperanza mine. His fortune was mostly derived from mining and from investments in Mexico. His real estate holdings in the Federal district of Mexico were the basis of a small fortune. He owned mining property in other sections of Mexico. He was prominent in the business and social life of the American colony. Mr. Quirk was one of the active developers of mining claims in Butte in the early days. He was known there as a man of kindness and philanthropy. He leaves a widow and two children.

Societies and Technical Schools

American Institute of Consulting Engineers—A meeting of this society will be held at the Engineers' Club, New York, Dec. 12, for the purpose of discussing the subject of "Professional Relations." The annual meeting of the institute will be held on Jan. 14 next.

National Society for Promotion of Industrial Education—The society has issued a provisional program for its sixth annual convention to be held at the Hotel Walton, Philadelphia, Dec. 5, 6 and 7. At the first day's session there will be discussion upon such subjects as present tendencies in vocational education, debatable issues in extending vocational education in Pennsylvania, and efficiency factors in training teachers. In the evening there will be a banquet at the Hotel Walton and a symposium on Federal aid for vocational education. On Dec. 6 and 7 the speakers will discuss various other phases of the society's work, particularly in the relation to state legislation for vocational education.

American Mining Congress—The preliminary program for the annual meeting at Spokane, Wash., provided for two sessions on Nov. 25, to be devoted to addresses of welcome and other opening proceedings, and to the annual address of the president. In the evening a reception was tendered by the Chamber of Commerce and the Spokane Club. Nov. 26 was devoted chiefly to reports of committees, with addresses on the relations of the Federal Government and the mining industry, by Senators Borah of Idaho, Poindexter of Washington and Smoot of Utah. Addresses were also expected from Dr. J. A. Holmes on the Bureau of Mines, and from Charles S. Thomas, of Denver, on mining-law revision. On Nov. 27 the sessions were to be devoted to discussion of the policy of the government with relation to public lands in the morning sessions, and to Alaska in the evening. Nov. 28 the main subject at the morning sessions was to be workmen's compensation, accidents and legislation relating thereto. The evening was to be devoted to entertainment. On Nov. 29 the morning session was to be given up to committee reports and to a discussion on mine taxation. The closing session in the afternoon was to be taken up by discussion on means for protecting mining investors and for furthering the interests of the mining industry.

Editorial Correspondence

From our Representatives at Important Mining Centers

San Francisco

Nov. 20—The negotiation which has been pending between the General Petroleum Co., of San Francisco, and the Union Oil Co., of California, is reported in San Francisco to have been closed in New York, the General Petroleum Co. taking over the controlling interest in the Union. It is said that the first payment has been made. It is not publicly known here what amount was paid nor how much of the Union stock is included in the transaction. The General Petroleum Co. was formed three years ago under the name of the Esperanza Oil Co., and about one year ago, after having taken over large holdings in Mexico, the company was reorganized, its capital stock increased from $7,500,000 to $50,000,000, and the present name adopted. There has been insistent report that the Shell Transportation Co. has completed a deal by which it would assume control of the production of the Union and the General Petroleum. The present acquisition by the General Petroleum is not looked upon as being a denial of the report regarding the Shell Transportation Co. It is believed in some circles that the controlling interest back of the General Petroleum is the Standard, but that opinion is not generally conceded. Whether or not this transaction will have any effect upon the situation of the Associated cannot at present be definitely ascertained. Several months ago there was a quite general impression that the Shell Transportation Co., or the Shell-Dutch Co., would acquire the controlling interest of the Associated. It is believed by some that the result of the negotiation between these companies at that time depended upon some possible amalgamation of the Union and the Associated.

Denver

Nov. 21—The city of Denver has now taken the question of building the Moffat railway tunnel through the Front Range from Denver in hand through its several organizations, and in conference with Newman Erb during the last three days the following plan has been discussed and is considered feasible: Mr. Erb proposes to supply one-third of the funds and asks the city to use its credit to provide the other two-thirds. In addition, Mr. Erb proposes to guarantee the interest on the city's money and in time to pay off all the indebtedness incurred by the city on account of the undertaking. He further expects the railroad to own the tunnel at some future time. He will permit it to be used by any other road desiring that opportunity, which will result not only in greater traffic for the road, but additional commerce for Denver. The probable cost of the 4½-mile tunnel complete will be $4,000,000.

The suit between the Portland Gold Mining Co. and Stratton's Independence, Ltd., for $600,000, for the alleged illegal extraction of ore and infringement of territory, has been settled by a compromise. The terms have not been made public.

E. L. Brown, president of the Denver Rio Grande R.R., announces that within two years the electrification of the entire main line will be completed. The work will give employment to thousands of men and a tremendous impetus to prosperity in Colorado and Utah. Within two weeks work will be commenced to electrify the division between Helper, Utah, and Salt Lake City, a distance of 115 miles. The cost is estimated as between $20,000,000 and $25,000,000. The electrification will be effected by the General Electric Co. Power for the Utah lines will be furnished by the Utah Utilities Co., and for the Colorado lines probably by the Central Colorado Power Co. The expenditures will include $3,000,000 for double-track detour over Soldiers Summit; $3,000,000 for electrifying the Utah unit; $2,500,000 for standardizing the Salida-Montrose line; $2,000,000 for electrifying Tennessee pass; $3,000,000 for increasing the capacity of the Central Colorado Power Co., which is planning to extend its transmission line into Colorado Springs and Pueblo, and $8,000,000 by the Utah power companies, which will electrify the Bingham & Garfield R.R., and all the plants of the Utah Copper Co. A large steam-generating plant will be built in Utah, to be used for emergencies on the Denver & Rio Grande. The question of electrifying Soldiers Summit was taken up by the Denver & Rio Grande last summer. The Telluride Power Co., a Colorado corporation, was expected to furnish the power. That company was unable to make the rates and was in financial difficulties. A few weeks ago its stockholders ordered the company dissolved and joined in a $52,000,000 merger of plants in Colorado, Utah and Idaho. This new company expects to spend millions for development purposes and will be able to furnish power to the railroad at a low cost.

A petition of the Portland Gold Mining Co., filed in the district court in Teller County, asks for a temporary restraining order to prevent the county treasurer, S. C. Paxson, and the board of county commissioners from offering the property of the company at public sale to pay taxes. The Portland property was assessed at $200,819 in 1910 and the taxes were $7549. In 1911 the assessed valuation was $338,610 and the taxes $11,885. The company declares the taxes exorbitant and gives this as a reason why taxes have not been paid. Fifteen of the larger mining companies of the Cripple Creek district are represented in the suit which is instituted under the name of the Acacia Gold Mining Co. and associated companies. In a similar suit last year the mining companies won.

Butte

Nov. 20—Steps have been taken, subject to the approval of stockholders, toward merging the Butte Electric Light & Power Co., the Missouri River Electric & Power Co., the Madison River Power Co. and the Billings & Eastern Montana Power Co., the new corporation to be known as the Montana Power Co. A special meeting of the stockholders of the Butte Electric Light & Power Co. will be held Dec. 12, to consider and vote upon the plan. The directors of the new company will be the same that have in the past directed the policies of the Butte Electric & Power Co., and the Great Falls Power Co., i.e., John D. Ryan, John G. Maroney, C. F. Kelly, Marcus Daly, and Max Hebgen, of Montana; J. & W. Seligman & Co., C. W. Wetmore, C. A. Coffin, C. H. Sabin and S. Z. Mitchell, of New York; Gardner M. Lane, of Boston; J. G. Schmidlapp, of Cincinnati; Fleming & Co., of London; and others, with C. W. Wetmore acting as president, and Max Hebgen as vice-president and general manager. The company will be capitalized for $100,000,000; three-quarters of the amount to be common and the remainder preferred stock. A new hydro-electric plant will be built at Wolf Creek, and work has already been started upon a dam across the Missouri River at this place to form an immense reservoir. Also the initiatory work is in progress for the erection of another large dam at the Great Falls of the Missouri for the development

of hydro-electric power, where it is believed a manufacturing center will be created similar to that built up by hydro-electric power development at Niagara. With the immense amount of power developed by the plants of this company, it is proposed to operate the trains of the transcontinental railroads in the Rocky Mountain region, as well as to supply commercial light and power to all of the cities and towns in Montana. The plans also include the reclamation of thousands of acres of dry bench lands by irrigation by pumping water by electric power from the rivers and lakes for distribution.

Salt Lake City

Nov. 21—During October, seven Utah mines distributed $426,979 in dividends. These included the Daly-Judge, $45,000; Daly West, $27,000; Centennial-Eureka, $150,000; Grand Central, $25,000; Iron Blossom, $100,000; Mammoth, $60,000; Opohongo, $19,979.

Bulletin No. 523, treating of the western nitrate deposits, has just been issued by the U. S. Geological Survey. Utah, Idaho and Nevada are given considerable attention.

Nitrates of sodium, and of potassium, are found in Utah, near Marysvale, in Piute County, and from several other places. Niter salts also occur in the southwestern part of Idaho, near the Nevada-Utah line, and in Bannock County, near Soda Springs, as well as near Pocatello, in Blaine County. While all these deposits are not immediately available, the demand for this kind of salts is shown by the fact that during 1911 the United States imported $16,814,268 worth of nitrates.

All the mines of Bingham Cañon are now in operation, but are still hampered by shortage of men.

Negaunee, Mich.

Nov. 21—The big find of the Longyear interests, under the name of the Nevada Land Co., in the Mastodon district at Crystal Falls, has been a triumph of applied geology. The 1912 appraisal of the Michigan tax commission values the find at $565,000, and as yet the property is only in the exploratory stage. Five years ago the land was popularly thought to be worthless in mineral possibilities as previous operations and explorations in the vicinity had been ill-fated. The Longyear Exploration Co. of Minneapolis, prominent in diamond-drill work recently added a geological department to its staff. Geological field work carried on in the Crystal Falls area showed that in spite of previous failures the Mastodon region was a favorable place for ore. Diamond drilling was commenced; 15 or 20 holes were put down with no result, but the work was persisted in because the geological outlook was favorable. Finally one hole struck the edge of a deposit and cut a few feet of ore. Other holes then indicated the strike of an orebody. Upon drilling angle holes across the iron formation a gray slate, dipping like the ore at about 60°, was encountered as a foot wall and the holes were stopped in that. Later, thin sections of the slate were made and studied under the microscope. The drill-holes were then continued through the slate, and struck more ore and more slate interbedded in the iron formation. The best ore was found concentrated on the slates. The ore found at first on what was thought to be slate is only a fraction of what has been found on the slates in the lower horizons. The bottom of the ore formation has not yet been reached.

Seattle

Nov. 18—Col. W. P. Richardson, chief of the Alaska road commission, and Lieut. Glen E. Edgerton arrived in this city, from Valdez, on their way to Washington, D. C. Although road building in Alaska was greatly handicapped by the heavy rainfall during September and October, Colonel Richardson expressed pleasure over the amount of work done this year and stated, that it was his belief, that it would be but a few years until the importance of wagon roads for the development of Alaska would be realized and more national assistance given in their construction. In speaking of the work done this season, he said: "The rebuilding of the road from Nome to Bessie Level, was, no doubt, the most important piece of work done under our direction during the season. This is one of the most important roads in the north, it being a trunk line for several roads which assemble several miles out of Nome. Last year 23,000 tons of freight were hauled over this road. In all something like 25 or 30 miles of road were built this season and a great deal of repair work done on old roads and four new bridges were built." The longest stretch of road built by the Alaska road commission this season was the 15 miles to the Circle City and Birch Creek road, while the season's work included the building of three miles of road connecting Juneau and Sheep Creek the completion of the Seward and Inioke road, the improving of the Fairbanks and Valdez trails; the building of a winter shed-road from Ruby City to Salauta; the building of a trail from Cook Inlet to Willow Creek camp; the building of a winter trail from Seward to Iditarod; the improving of the Fairbanks and Coast roads and the building of bridges across Stewart Creek, Delta River, Jarvis Creek and Pile Driver Creek. Lieutenant Edgerton will purchase bridge material to be used in the construction of two bridges at a cost of $20,000 each over Nazina and Gilkana rivers. Members of the Alaska railway commission, including the following, have just arrived from a thorough investigation of railroad conditions in the North: Major J. J. Morrow, of the U. S. Army Engineers; Dr. Alfred H. Brooks, of the Geological Survey; Lieut. Leonard M. Cox, of the U. S. Navy Engineers; and Colin McCrea Ingersoll, a bridge engineer of New York. The commission has spent several months in Alaska investigating the transportation problem. Upon the recommendation of this commission the entire future policy of the Government may hang.

Porcupine

Nov. 22—The strike situation remains practically unchanged with the exception that after the first disorganization, due to the men going out, more work is being accomplished at the mines. Interest naturally centers around the Dome and Hollinger properties, as they are the two largest in the district, and the smaller companies are sitting tight waiting to see what they will do. The general feeling among the operators is that the strike will not last much longer. The union is short of funds and the majority of the men were not in favor of stopping work, but were intimidated by the more aggressive members. The Dome is working steadily at more than half capacity and as soon as new men come in, which will probably be in about a week, the production will again reach normal. The Hollinger is also working, although under greater difficulties than the Dome, on account of the different methods of mining. Both of these companies are firm in their intention to have nothing to do with the union and will continue work on the old schedule. The McEnaney mine, where the men first went out, is working on the old schedule. and has no intention of giving in. Four small properties, the Pearl Lake, Schumacher, Porcupine Lake and Three Nations have compromised with the union, but all the others will stand firm. In the accompanying table the scale that has been paid by the mines is compared with that demanded by the union.

COMPARISON OF WAGE SCALES

	Union Scale eight hours	Mine Scale nine hours
Machine men	$4.00	$3.50
Machine men, sinking	4.50	4.00
Machine helpers	4.00	3.00
Machine helpers, sinking	4.50	3.50
Muckers	3.75	2.75
Timbermen	4.25	3.50
Timbermen, helpers	3.25	3.00
Compressor, and hoist engineers	4.00	4.25(12 hr.)
Surface hoistman		3.50
Underground hoistman		3.00
Blacksmith	4.25	4.25
Machinists	4.25 (50c. per hr	3.50
Pipefitters	4.00 (overtime	3.00
Firemen	3.75	3.25 (12 hr.)
Surface labor	3.50	2.50
Cooks	100.00 per mo. and board	
"Cookie"	85.00 per mo. and board	
Chore boy	75.00 per mo. and board	
Board	1.00 per day	0.75

The Mining News

The Current History of Mining

Alaska

Another strike of rich placer gold has been made near Nome, on the Bay State group of claims. It is believed by some that this is the long sought continuation of the third beach line. Much excitement prevails.

Soo—A rich strike has been made on this claim, at the head of Dome Creek; Capt. W. L. Spalding, owner.

Alaska Consolidated Mining & Dredging Co.—Gravel panning from 25c. to $3 per pan has been uncovered on this company's claims, on Boulder Creek. W. L. Cochrane, of Nome, is president.

Threeman—A shipment of ore was recently sent from this mine on Prince William Sound to the Tacoma smeltery. W. A. Dickey, Landlock Bay, is manager. Improvements are being planned.

Alaska-Juneau Gold Mining Co.—F. W. Bradley, of San Francisco, has a contract with this company whereby he is to receive a portion of the company's capital stock as consideration for driving a tunnel, certain development work, and building a mill near tidewater. This contract was entered into in December, 1909, and the work has been progressing continuously since then. The tunnel has been advanced about 4000 ft., but has not yet cut any mineral deposit of value. Mr. Bradley has the option, under his contract, of not building the mill if developments are not entirely satisfactory.

Arizona

Mohave County

Golconda—This mine is shipping about 40 tons of 45% zinc concentrates per day. A crosscut has recently been started to cut the vein at a depth of 250 feet.

Maricopa County

Joe Fuller has been developing a gold claim near the Vulture mine. There is a shaft more than 200 ft. deep on one of the claims, and coarse gold has been taken out recently.

Palo Verde—At this mine, west of Arlington, five men are employed in sinking a shaft, which has reached a depth of 186 feet.

Roosemoore—One shaft at this mine, near Mesa, is 85 ft. deep. Galena rich in silver has recently been found in this shaft. High-grade copper ores have been found in other shafts, and these will be shipped to the smeltery at Hayden, as soon as the railroad completes a siding to the vicinity of the mine.

Rover—A shoot of rich ore has been found on the 240-ft. level of this Phœnix mine. Stoping will be started at once.

Vulture—Concentrates from this mine are being shipped from Wickenburg.

Gilbert—A carload of carbonate ore from this property, in the Blue Tank district, will be shipped to the smeltery from Wickenburg within a few days.

Santa Cruz County

Red Hill—George Januel is now shipping from this mine, near Nogales; the ore contains gold and some silver.

R. R. R.—John D. Wansing is now in charge of this mine, succeeding W. S. Sultan, who has been promoted to other work at Globe for N. L. Amster.

Mineral Hill—Harrington & Ellsworth have made a shipment of ore from this silver-lead vein owned by John Allen and associates. The ore was hauled to Chavis station on the Tucson-Nogales R.R.

Blue Lead—This mine near the Ivanhoe in Temporal cañon, has been sold by James Johnson, of the latter company, to J. M. Kellogg, a Colorado operator of experience.

Austerlitz—This mine at Oro Blanco is still shipping at the rate of one carload per day of $40 gold ore, which is hauled to Amado station for $8 per ton and thence to the Pioneer smeltery, near Tucson. Several neighboring mines, notably the Switzerland, have also struck good ore and the camp has taken on new life. The First National Bank of Nogales is financing the mine, which is under bond from Doctor Noon and associates to Woodworth & Lane.

California

Amador County

Lincoln Consolidated—It is reported that the drift has cut a vein in the Wildman on the 1950-ft. level; W. J. McGee, of Sutter Creek, manager.

Argonaut—The cleanup for October was one of the best in the history of the mine. Dividends are withheld pending the settlement of the suit of the Kennedy Extension, which has been in progress for the last two years.

Calaveras County

Recent rains, and a heavy fall of snow at Silver Lake, indicate a good supply of water in Angels Camp and neighboring districts.

Emerson—This gravel mine, near Mokelumne Hill, has been prospected and preparations are being made for ground sluicing. The ground will be broken with black powder, and carried into sluices with about 200 in. of water. The tailings will be impounded. J. D. Galloway, of Vancouver, is manager; George Emerson, superintendent.

Boire—A recent cleanup at this gravel mine, at Railroad Flat, produced $1000, representing the labor of six men for six days; Boire Bros., owners.

Marshall—This mine, at San Andreas, has been sold by order of the superior court to George D. Clarke, one of the owners of the adjoining Chapman mine.

Kern County

Mammoth Mountain Mining Co.—This is a new company incorporated to operate in the Kern River district, 60 miles northwest of Randsburg. Capital stock, $100,000. The directors are H. M. Russell, L. B. Russell and Charles Donelly, Jr., of Randsburg.

King Solomon—This mine will be equipped with electric hoist as soon as the substation of the Southern Sierras Power Co. is ready to supply the power. About 100 tons of high-grade ore is on the dumps and ready for shipment to the Red Dog mill. Little work has been done above the 250-ft. level, although the ore is exceptionally rich in the upper workings; Edward Shipsey, owner.

Butte—A big oreshoot was recently found on the 100-ft. level, and is being stoped.

Yellow Aster—A new air-lift pump has been installed in the 1700-ft. sump. This pump works under 84 lb. air pressure and lifts 25 gal. per min. 850 ft. The installation was made by W. D. Peter, chief engineer. The pump is the invention of Bryan Obear. The peculiar features of the pump are the small submergence, the absence of moving parts, the increase of efficiency with a falling pressure and decrease with a rising pressure. The pump is an experiment which is reported to be proving successful.

G. B.—About 150 tons of low-grade ore is ready for hauling to the Tip Top mill from this mine in the Stringer district. The ore will be cyanided at this mill, satisfactory tests having been made. C. G. Illingworth and others, of Randsburg, are lessees.

MARIPOSA COUNTY

Oro Rico—It is reported that the extraction and milling of ore at this mine, three miles west of Coulterville, will be resumed. The property is equipped with a 20-stamp mill. The mine has been in litigation for several months.

Clearing House—Operation of this mine, in Merced River Cañon, which was suspended for about one month, owing to lack of water, has been resumed.

NEVADA COUNTY

Champion—The North Star Mines Co. will build a cyanide plant at this mine, on Deer Creek, which the company is operating under purchase bond.

Brunswick—Harry J. Cornelius, of Grass Valley, and William Nichols, of Soulsbyville, Tuolumne County, are reported to have been killed Nov. 2, by the inhalation of gases in the mine.

Champion—A record for fast drilling is said to have been made in October. A total of 755 ft. was made at three levels, 248 ft. north on the 1000-ft. level, 245 ft. on the 1600-ft. level, 262 ft. on the 2400-ft. level. Leyner air drills were used; one man to each drift, working three eight-hour shifts. The best record for one week was 71 ft. One hundred and seventy rounds were blasted, averaging about 13 tons to the blast; each blast averaged eight holes, and used 31 lb. of powder.

Pennsylvania—The new cyanide plant is in operation and doing satisfactory work. The plant is equipped with Oliver filters. The shaft has reached the 2000-ft. level, and it is reported that the returns from the ore treated more than pay for the development. The cyanide plant is said to have cost $30,000. Frank Vestal, of the Empire mine, is in charge.

Fairview—The sale of 200,000 shares of delinquent stock is advertised. The shareholders are principally residents of Wisconsin, who purchased the shares from C. M. Wilson, Arthur Hoge and others, of Nevada City.

PLACER COUNTY

Midas—This gravel mine, on the extension of the channel formerly worked by the Hidden Treasure, is being developed; Midas Mining Co., of Stockton, owner.

Beaver Gold Dredging Co.—The dredge is working through the Capt. Hawk ranch and is reported to be taking out good pay.

Barton—Laird & Quinn, of Auburn, have leased this gravel mine, near Loomis.

TUOLUMNE COUNTY

App—The foreclosure sale of this and other properties of the Nevills estate, advertised for Nov. 17, was stopped by an injunction suit brought in San Francisco by the estate of Stanton L. Carter against the Central Land & Trust Co. The sale was to have been made in Fresno County.

Colorado

CLEAR CREEK COUNTY

Manhattan-Union—This property is shipping four cars of zinc and lead ore per month. The zinc ore averages 40% zinc and is worth about $27 per ton. The lead ore averages about 40% lead, which together with the gold and silver, nets about $30 per ton. The ore is hand sorted and is shipped crude. The property is under lease to J. A. Force, of Denver.

Homestake—Development will be resumed at this property on Lincoln Mountain. The crosscut tunnel, which is now 540 ft. long, will be advanced to intersect the east extension of the Golden Jack vein.

La Plata—It is reported that a six-inch vein of silver ore has been struck in this property on Democrat Mountain. Lessees have opened the vein for a distance of 60 feet.

Capital—The raise from the tunnel level is now up 475 ft. and the 10-in. drill hole on the Aetna vein has been sunk 600 feet.

Rosebud—The east drift on the upper tunnel level has cut an eight-inch vein of sulphide silver ore; George W. Teagarden, manager.

Josephine—Development will be resumed on this property on Kelso Mountain, West Argentine district. The company contemplates the installation of a compressor plant.

Franklin—A winze is being sunk from the 100-ft. level. Lessees have recently struck a 14-in. vein of rich gold and silver ore.

Lombard—This property in Cumberland Gulch is being systematically developed by Henry I. Seamann. The fourth level is being driven to open the ground already prospected in the upper levels. Raises will be extended to connect with the second and third levels. A large quantity of milling ore is reported to be partially developed.

Hoosac—This mine, operated through a tunnel by E. D. Quigley, of Idaho Springs, for the last 12 years, is said to have an oreshoot 1800 ft. long, with backs of from 400 to 1600 ft., the ore being sulphide carrying gold, silver and copper. The mine is about one mile above Idaho Springs and a quarter of a mile below Fall River, and parallels the Specie Payment and Champion, both large producers. A mill is under construction by Peter McFarland & Co., of Denver.

LAKE COUNTY—LEADVILLE

Lackawanna Belle—The tunnel of this property on the west side of Lake Creek in Lackawanna Gulch is in 1400 ft. and a contract has been let to Clyde Bockwell to drive it 800 ft. further this winter. It is being driven to develop the Miller group of gold veins.

Fair Play—At this mine in Adelaide Park, 10 men are employed under Manager Covey, and about $16,000 worth of ore has been shipped since spring. Ore is now being shipped from the new drift at the 165-ft. level.

TELLER COUNTY—CRIPPLE CREEK

Mary McKinney—The output for October was 38 carloads, worth about $35,000. The water having receded at the ninth level, a drift will be driven to the 800-ft. shoot of ore proved at the eighth level. Five machines are at work on ore above that level, and the mine is being put in shape for a heavy production.

Jerry Johnson—The October output from this mine, on Iron Clad Hill, made by Lessee Caley and his sub-lessees, was 450 tons.

Free Coinage—A stockholders' meeting at Altman, on Dec. 14, has been called by John B. Neville, president, to elect directors for the next year. The ore production for the year has been satisfactory.

Granite—This company, owned chiefly by the MacNeill-Penrose interests, mailed checks, Nov. 19, for a one-cent dividend, amounting to $16,500. The recession of the water is such that Superintendent B. McCarthy expects to operate on the 1100 level in about two weeks. Meantime the production is steady. Howbert & Price, lessees, are shipping mill ore from the seventh levels of the Dillon shaft.

Gold Sovereign—This mine, controlled by Mr. Hinds, of Le Mars, Iowa, who is president and has been at the head of its affairs for many years, has been through several fights for control and had other difficulties, but is now said to be in good shape, and has a new vein from which it is shipping from 10 to 12 carloads of milling ore per month. It is under lease to the Union Leasing Co.

Dante—From this mine, on Bull Hill, a carload of 27½ tons gave returns of $97 per ton; it came from the 500 level under lease to Armentrout & Cohn.

Colorado City—Robinson & Co., lessees, on this Portland property, are reported to have driven 50 ft. on three feet of ore which assays $35 per ton.

Blue Flag Mill—The quantity of ore treated is now expected to average 125 tons per day of $4 to $6 ore, from shoots recently developed in the mine.

Deerhorn—About six carloads per month is the output of this mine, on Globe Hill, under lease to William Fitts.

Doctor Jack Pot—A body of ore from which grab samples run $30 per ton, is reported to have been struck by the Kelly Exploration Co., lessees, at the bottom level of the Davenport shaft.

Idaho

Bonner County

Webber—Recent developments have exposed a large body of ore which carries gold and silver.

Golden Scepter—The lower tunnel, which has a length of 1000 ft., shows 6½ ft. of concentrating ore in the face. This shoot has been opened along its length for 150 feet.

Idaho Continental—Preparations are nearly completed for continuous shipments during the rest of the winter. Auto trucks are being used to haul the ore; 150 men are at work completing the road.

Idaho County

Mineral Zone—Crosscutting has been begun from the second level. It is estimated that 40 ft. will have to be driven to cut the vein.

Mascot—A bar of bullion valued at several hundred dollars, representing the first cleanup from the new mill was shipped to Spokane recently. The new Wilfley table is installed and working satisfactorily.

Moscow—This property has been bonded to Los Angeles men for $100,000.

Little Butte—A winze is being sunk in the lower tunnel, 400 ft. from the portal. The first 30 ft. of sinking shows good free-milling ore.

American Eagle—The raise has been driven 40 ft. and will soon connect with the upper level. The hoisting plant is already installed and sinking will begin in a few days.

Latah County

Mizpah Copper—It is hoped to make shipments to the smelter, but in any event development will be pushed all winter. In the No. 5 tunnel a shoot of ore 110 ft. long and 25 ft. wide has been opened up. The company plans to install a mill later. J. J. Stanford is superintendent.

Michigan

Copper

Ojibway—No. 1 shaft has reached a depth of 2100 ft. and from the 1900-ft. level a raise is being put up to reach the lode, instead of driving a crosscut, which, owing to the flattening of the lode, would have to be extended a considerable distance. No. 2 shaft is temporarily bottomed at a depth of 1900 ft. Lateral openings in the lower levels are opening ground of average copper contents, but it is irregular and bunchy. A large stockpile has been accumulated during the development of the property and this may be shipped to one of the mills in the district in the near future.

Tamarack—The work of remodeling this company's mill is going on. The plans call for the installation of tube mills, Woodbury jigs, Wilfley tables, etc. So that when the mill is completed it will be along the lines of the Calumet & Hecla mills.

Houghton—Sinking in the winze from the 625-ft. level has been discontinued at a depth of about 200 ft. In sinking this winze three copper-bearing formations were cut. The west lode which is being opened so successfully at the Superior has not proved as rich as the main lode. An exploratory crosscut is being driven from the north drift of the 625-ft. level.

La Salle—The work of moving the surface equipment from shafts No. 5 and 6 to the site of shafts No. 1 and 2 is progressing and this property will soon be in shape to resume operations. No. 1 shaft is bottomed at a depth of 2100 ft. and a large amount of development work has been done, so as soon as the shaft is unwatered and the hoisting equipment installed shipments can be made to one of the Calumet & Hecla mills. Sinking will be resumed at No. 2 shaft, which is now bottomed at a depth of about 1800 feet.

Mohawk—A decided improvement is being noted in the ore in the northern workings. The north drifts from No. 1 shaft toward the Gratiot are showing some good ground equal to the better showing in the southern portion. The new No. 6 shaft tributary to North Ahmeek is developing ground that will be a big factor in the future of the property.

Calumet & Hecla—The foundations for the new electrolytic plant at Hubbell have been completed, but the iron work will not be erected until spring. Sixty-five 40-hp. General Electric motors are to be installed in the mines and smeltery.

Iron

Cascade—A wooden headframe is being erected over the new shaft now being sunk. It will be used until sinking is finished, when a steel headframe will be built.

Corrigan, McKinney & Co.—This company has formerly confined its Menominee range mining operations to the Crystal Falls district, where it is the dominant interest. Recently, however, preparations have been made for extensive mining in the Iron River district. Several orebodies proved by diamond drilling are controlled by the company in the Iron River field, including the Tully, Baker, Blair and Michaels. Active development is in progress at the Tully. The shaft which gave so much trouble before the ore was reached has been pumped out and a complete surface plant is being built. It is planned to sink a second shaft several hundred feet to the east, as the orebodies are scattered; the surface here is also thick and of quicksand nature. The Baker mine, just east of the Tully, which was abandoned two years ago on account of disagreements with the fee owner, may also be reopened and pumped out, as this would reduce the water level at the site of the proposed No. 2 Tully shaft.

Cleveland-Cliffs Iron Co.—This company has taken an option on the lands of the Sheldon estate in Mastodon township, Crystal Falls district, following test-pit exploration of the property recently optioned in Sec. 12, 42-32. Work has been commenced on Sec. 1, just west of the Dunn mine of Corrigan, McKinney & Co. The famous Mastodon find of the Navada Land Co., assessed at $565,000 by the State Tax Commission, is just to the south on Sec. 13.

Anvil—At this mine of the Newport Mining Co., at Bessemer, exceptional progress is being made in sinking the new vertical shaft. "Jackhammer" one-man drills are being used, sometimes as many as six at a time. Short holes, about 4 ft. deep, are drilled. The sinking is now in hard quartzite, but will soon be in slate; there was but a few feet of surface. The shaft will be 18x10 ft. 10 in. inside dimensions, and steel sets will be used, each set being self supporting.

Richmond—This open-cut mine on the Cascade range has been closed for the season after shipping more than 100,000 tons of low-grade siliceous ore. About 30 men were employed by M. A. Hanna & Co., which operates the mine.

Minnesota

Mesabi Range

Morton—Stockpiling has been started and will be continued throughout the winter; 125 men are employed, but the force will probably be increased as the season advances.

Scranton—This property will be operated on a much larger scale than last winter.

Bennett—A large force of men is clearing the land preparatory to stripping. It is estimated that 10,000,000 yd. of overburden will have to be removed, a contract for 1,000,000 yd. will be let soon. A shaft will be sunk on Sec. 24; boiler houses and pumping plant are being built. The property consists of four "forties" one mile from Keewatin and will be opened by a subsidiary of the Meridan Iron Co. It is expected that shipments may be started in the spring. O. B. Warren is in charge.

Bray—The concrete stack has been completed and the engines are being installed. Stripping will be continued throughout the winter. During last season one shovel was used at the mine and a total of 200,000 tons of ore was shipped, the shipments for some days amounting to 90 cars.

Mahoning—Five shovels were at work on ore and three on stripping at this

mine during last season. The last shipment for the year has been made, the season's total amounting to 1,500,000 tons, which is about the average for the property during recent years. Strippings will be continued until the close of the year and if the winter is favorable may be continued.

Section Four Mining Co.—A contract will be let for sinking a shaft. Further development work will be started in January. The property is known as the Wickey farm and adjoins the Fayal and Genoa.

Missouri

Flat River District

St. Joseph Lead Co.—This company, at Bonne Terre, is adding to its power-plant equipment at the Leadwood mines a large 1000-kw. General Electric alternating-current generator. In the power plant of the Bonne Terre mines a new General Electric 1250-kv.a. Curtis turbo-generator is being added.

Joplin District

Belville is coming to the front as an ore producer, the greatest activity being on the Murphy & Davidson lands where ore is being mined from 70 to 80 ft.; 6000 ft. of drilling will be done by Christmas.

Mining operations have been resumed at Gordon Hollow during the last few months. Ore was formerly mined at shallow depths by small operators, but these have given way to larger companies, among which are the Mattes Bros., C. C. Playter, the Independence, the General Lead & Zinc Co., the Priscilla, and the Geronimo companies.

Chapman & Lennan—These operators have been drilling the Walker land, north of Webb City. A 30-ft. face of lead ore was struck in the fifth hole at a depth of 60 ft. The other four holes also showed ore, the fifth being a bonanza strike.

Federal Lead Co.—This company, operating large lead mines in the southeastern part of the state, is prospecting several leases in the Joplin district. Southwest of Prosperity 12 holes have been sunk and a sheet-ore run proved at a depth of 190 ft. A shaft has been started on this lease. The ore is low grade and will require a mill of large capacity. Drilling is also being conducted on the old Troup farm and sheet ore has been encountered at 230 feet.

Pocahontas Mining Co.—A second shaft is being sunk to 190 ft., 250 ft. north of the mill, the object being to provide ventilation and shorten the underground haulage. An inclined tramway will be built from the new shaft to the mill hopper. A systematic drilling campaign is being conducted and good ore encountered north of the mill.

Montana

Butte District

Alex Scott—Ore reserves have been considerably increased lately by opening a vein of 4% copper ore, averaging 20 ft. in width, on the 1800-ft. level. This orebody was mined on the 1600- and 1700-ft. levels, and is proving richer and wider as depth is attained. The vein has also been developed to some extent on the 1900-ft. level from the shaft of the adjoining West Colusa mine of the Anaconda company, with good results. On the 200-ft. level a vein was recently opened which averages about 3½% copper, with small bunches of high-grade ore. The company recently paid a dividend of 50c. per share on its 74,000 shares of stock outstanding from earnings, which are in the neighborhood of $25,000 monthly. Preparations are being made to increase the output of the mine.

Butte & Superior—Within a week or so the work of installing the new hoisting engine and headframe, which has been in progress for the last six weeks, will be completed. The engine, which was built by the Nordberg Mfg. Co., has capacity for hoisting from a depth of 3000 ft. A Nordberg air compressor, having a capacity for 5000 cu.ft. of air per min., has also been installed. The compressor will be rope driven by an 800-hp. motor. Ore will be hoisted in skips lifted by a flat steel cable. The work of remodeling parts of the concentrator will also be finished in a short time, and when completed the plant will have capacity for treating more than 2000 tons of ore daily. The changes include the installation of Garfield tables in the place of the coarse jigs, and the addition of a series of Wilfley tables to save lead. The Colonel Sellers shaft is being sunk steadily, and is expected to connect with the crosscut driven from the Blackrock shaft on the 1200-ft. level, in a short time. During the shutdown the mill has been treating between 400 and 500 tons of ore daily from a stockpile.

Rainbow Lode Development Co.—Duluth men have organized this company for the purpose of developing a group of seven claims situated north of the property of the Butte & Superior company. Edward C. Congdon, Thomas F. Cole and others, of Duluth, are organizers of the company, which has a capitalization of 80,000 shares of stock, par value, $10 The claims are the Third Sphinx, Michigander, Morel, Valley Queen, Carnbrea, Wanda and an interest in the Sarah. A shaft will be sunk on the Third Sphinx, and development work, will be done on all of the claims from this shaft.

Broadwater County

Within three months the Three Forks & Radersburg railroad will be completed and in operation between Radersburg and Three Forks, where it joins the main line of the Milwaukee & Puget Sound R.R. The grading of the road was completed, with the exception of four miles of the total 25, several months ago, but the work was then suspended by the contractors for financial reasons. Since then the work of financing has been successfully accomplished, with the result that the remainder of the grading, and the laying of steel will be started at once. Mining at Radersburg will be revived with the completion of shipping facilities, and the Keating mine, which has for some time been shipping less than 100 tons of ore daily by wagon will increase its tonnage to about 250 tons, which can easily be accomplished, considering the quantity of ore that has been blocked out in the last few months.

Nevada

Nye County

Shipments in tons from Tonopah mines to date and for the week ended Nov. 16, are as follows:

Mines	Week	Year to Date
Tonopah Mining	3,400	154,469
Tonopah Belmont	3,526	114,369
Montana-Tonopah	1,033	47,102
Tonopah Extension	1,070	46,313
West End	975	35,277
Midway	.....	820
MacNamara	470	17,249
North Star	45	356
Mizpah Extension	.....	40
Jim Butler	350	4,100
Totals	10,869	420,092
Estimated value	$271,725	

Tonopah-Belmont—The report of the company for October states that 12,100 tons of ore was milled for a net profit of $164,697. Two new veins of good ore have been opened on the 12th level and a new vein of milling ore has been cut on the 11th level.

Tonopah Mining Co.—The report for October states that 15,164 tons of ore, averaging $18 per ton, was milled for a net profit of $135,765.

Tonopah Merger—The mine has commenced shipments to the old Belmont mill and it is expected to maintain these at the rate of 200 tons a week.

Jim Butler—The mine is now shipping 350 tons of ore weekly from development work only, on the 600-ft., where there are six working faces in ore. The company earned net profits of $4216 in October.

Tonopah Extension—The report for September states that gross receipts amounted to $61,135 and operating expenses were $38,188, leaving a net profit of $22,947.

White Pine County

Nevada Consolidated—The concentrator is now running at about full capacity, but there is a shortage of men both at the mines and the mill.

Veteran—An accident to the skip, resulting in tearing out some of the shaft

timbers, caused two days' interruption in shipping; several carloads are now being sent out daily.

Giroux—The drifts are being widened preparatory to using mules for drawing ore cars. An underground ore pocket is being built.

Oklahoma

Ottawa County

Miami Lead & Zinc Co.—This property, which is being operated by Chapman & Lennan, now has under construction a 250-ton mill which is expected to be in operation by the first of January. A two-compartment shaft is being sunk. This lease has been thoroughly prospected.

Miami Royalty Co.—This company has built two 250-ton mills in the southern part of the district. These have been running about a week. The mills are driven by 135-hp. gas engines. Each mine is equipped with an Ingersoll-Rand air compressor driven by 110-hp. gas engines.

Utah

Beaver County

Montreal—Ore showing native copper has been found at this property, near the Old Hickory.

Moscow—Additional teams are being secured, and preparations made to increase shipments.

Majestic—A statement issued from the Boston office shows 177 cars, containing 9127 tons, to have been shipped since May. Of this, 2169 tons brought a profit of $3500. There is stated to be much ore in sight at the Old Hickory, carrying copper and silver, with an excess of iron.

Horn Silver—It is reported that arrangements have been made to use one or two sections of the South Utah mill at Newhouse for the treatment of lead-zinc ore from this mine. There are large dumps of ore of milling grade, that, it is figured, can be worked profitably if handled on a large scale. Eighteen cars were shipped recently to the smelteries in Salt Lake Valley.

Juab County

Tintic shipments for the week ended Nov. 15 amounted to 220 cars, which is one of the heaviest week's production in the history of the camp.

Beck Tunnel—The October output netted $1600.

Eagle & Blue Bell—A visit was recently made to this property by the president and some of the directors. There is a good showing of ore on the 1300, which has also been cut on the 1350-ft. level.

Colorado—Net earnings for October amounted to $5500.

Uncle Sam—Driving is under way toward the Richmond-Anaconda, which property has been acquired by the Uncle Sam. One or two cars of zinc ore are being shipped monthly.

Dragon Consolidated—October shipments brought net returns of $2000.

Yankee—Settlement has been received on two cars of zinc ore, which brought $24 per ton. More ore is in transit.

Iron Blossom—October earnings amounted to $51,000, which is at the rate of $53,000 per quarter, in excess of the dividend requirement.

Middle Swansea—The control of this property, adjoining the Eureka-Swansea Extension, has been secured by the Knights. The company has been reorganized, and new directors elected. Jesse Knight is president.

Gemini—This company recently shipped its first car of zinc ore. The property has produced a large tonnage of silver-lead ore, and has hitherto paid no attention to its zinc ores. It is a close corporation, and $2,130,000, or $426 per share, has been paid in dividends. Zinc ore is being opened in various parts of the mine.

Salt Lake County

Utah Consolidated—A dividend of $1 per share has been declared, payable Dec. 17, bringing the 1912 dividends up to $1.50 per share. Net earnings for the first half of the year are reported in the neighborhood of $300,000, from the shipment of the regular copper ores and from lead ores amounting to 8025 tons.

Bingham Mines—This company is working about 50 men at the Dalton & Lark property. A small force is being worked at the Commercial mine, where operations are being increased.

Utah Metal—There remains about 1300 ft. or less to be driven, before this company's 11,000-ft. tunnel is completed. The work should be finished by spring.

Columbus Consolidated—The pumps have been pulled, and the mill closed for the winter. A tentative agreement has been signed with the Columbus Extension, Superior Alta, and Flagstaff Consolidated to combine the four properties on terms to be agreed upon in the near future. It is planned to have a new company take over these mines and finance them, to provide funds for meeting present indebtedness, with enough left over to drive a drain tunnel to the mines, and erect a new mill.

Toledo—A leasing company, recently formed, has secured a lease on this property at Alta. Work will be started in the No. 1 tunnel.

Alta Consolidated—Shipments are being made from this property.

Summit County

Park City shipments for October amounted to 7443 tons, this being about the average production. In addition to the regular shippers, the Ontario lease, the Grasselli Co., Barry-Coxe, New York Bonanza, and lessees, E. J. Baggs and Charles Moore made shipments.

Daly-West—The quarterly report of this company has been discontinued, the plan being to enter into the usual detailed description of company affairs in the regular annual statements.

Tooele County

Eureka-Ophir—The 400-ft. level is being developed, and a car of ore carrying silver, lead and copper has been mined. These workings are the deepest of any on the Stockton side of the Ophir range, earlier development having been carried on as far as the 400 by old-time operators. D. F. Clinton, representing Pittsburgh men, is working the property, on which he has an option.

Hidden Treasure—Regular shipments are being made. An electric compressor, recently installed, will make it possible to increase the present output of two to three cars monthly. The ore is zinc and lead.

Washington

Ferry County

North Washington Power & Reduction Co.—The capacity of the mill, at Republic, since the installation of new rolls is 135 tons daily; a high extraction is reported.

Trojan—Operations at this mine in the Orient district are to be resumed under the direction of Alexander A. Anderson. The tunnel is now in about 800 feet.

Hidden Treasure—Rich gold ore has been encountered at a depth of 30 ft. on this property, near Orient; improvements are contemplated.

Orient Gold Mining Co.—This company, owner of the White Elephant mine, received first prize for the best individual exhibit of ore from the Orient district at the Spokane Interstate Fair.

Okanogan County

Dividend—Shipments are being made by auto truck to the railway at Oroville, six miles distant, at a cost of $2 per ton. The ore is an auriferous iron sulphide. J. C. Fisher is managing director.

Lakeview—Shipments are being made to Oroville by auto truck. The company is making preparations to increase the force and operate all winter.

Snohomish County

Glacier Peak—The company is considering the advisability of building a wagon road to Darrington with a view to shipping ore in the near future.

Stevens County

Copper King—With the installation of the compressor plant which has been ordered for this property in the Chewelah district, the output of the mine will be doubled.

Black Horse—A 75-ft. shaft for ventilating purposes will be sunk to connect with the 180-ft. tunnel in which high-grade tungsten ore is reported.

First Thought—The Platonic, Slimax and Moonlight, all on First Thought Hill, have been sold to J. C. Argall.

Juno Echo—Chewelah men have organized a company to operate this group. Quarters have already been erected and a small force of men has been put to work in the mine.

Wisconsin

Platteville District

H. E. Stephens and others have struck good jack by churn drill on the John Pitts land within the city limits of Platteville.

Grant County—This mine has been taken over by the Vinegar Hill Zinc Co. The lease adjoins the Empire mine.

Belmont—Development work has been resumed at this prospect, situated northeast of the Empire. Lansing, Mich., men are in control.

Fever River—The Wisconsin Separating Co. has acquired control of this property and is drilling the tract which lies just east of Elmo.

Southwestern—This mine, at Kendalltown, has been reopened by Thurber Bros. and associates from Mason City, Iowa.

Cleveland—This company has bought the Scrabble Creek lease which adjoins the Cleveland property at Hazel Green.

Wyoming

Carbon County

A shipment of 287 sacks of ore from the Fram and Klondike properties in the Snowy Range district has been made to the American Smelting & Refining Co. plant at Denver. The owners, Class, Stewart and Smelzer are considering plans for a small mill.

Canada

British Columbia

Carmi—An option on this mine on the west fork of the Kettle River, 60 miles from Midway, has been taken by the Granby company. The shaft has been unwatered and the workings examined, with results that are said to have been satisfactory. More than 1000 tons of high-grade ore is said to have been sacked and shipped from the property up to the present time.

May Blossom—Arrangements for shipping $40,000 worth of lead-silver ore during the winter have been made, according to J. C. DeHaan, secretary of the company. The source of the supply is a shoot that has been driven upon for more than 100 ft. on the tunnel level, or at a depth of 170 ft. The shipping ore has a maximum width of 38 in. A ¾-mile tramway will be built next spring.

British Columbia Copper—It is estimated that $100,000 will have been spent by this company, in its diamond-drill operations on the Voigt mine. F. Weekes, who is in charge of the engineering department, at Princeton, reports that six crews are working day and night.

Marion Group—Nickel and cobalt have been struck by Samuel Spencer, in this group of claims, on Whipsaw Creek. In addition these mines have yielded gold, silver, copper and zinc at another place in the property. Five tests of the ore are said to have shown a value of $46 per ton.

Slocan Star—Machine drillers are at work in the deep drift of this mine, which is owned by Spokane and Vancouver men. The machine men are receiving a bonus for footage gained over the average of the field. Bunches of ore have been encountered in the drift; the face is brighter with mineral than it has been for many weeks.

Ontario

Dryden Mining Co.—This company is developing two claims on Contact Bay in the Manitou Lake area. Two shafts are down over 20 ft. and an open cut has shown the vein to be 21 ft. wide.

Ontario—Cobalt

Shipments of ore and concentrates, in tons, from Cobalt for the week ended Nov. 23, and for the year to date, were:

Bailey	.....	21.57
Beaver	.....	363.75
Buffalo	.....	989.50
Casey Cobalt	.....	255.15
City of Cobalt	.....	914.99
Cobalt Lake	33.00	860.88
Cobalt Townsite	25.15	1,666.52
Chamb.-Ferland	.....	427.83
Coniagas	.....	1,874.33
Crown Reserve	29.61	417.82
Drummond	.....	383.05
Hudson Bay	.....	631.20
Kerr Lake	.....	712.22
La Rose	84.59	3,197.74
Lost and Found	.....	27.80
McKinley-Darragh	.....	2,307.43
Nipissing	.....	1,735.62
O'Brien	.....	325.43
Penn.-Canadian	34.45	97.90
Provincial	.....	22.22
Right of Way	.....	242.82
Timiskaming	.....	884.56
Trethewey	30.20	504.89
Wettlaufer	.....	406.96
Colonial	.....	63.14
Dominion Reduction Co	.....	56.64
Seneca Superior	114.13	148.53
Totals	351.13	19,540.49

W. F. Campbell, of London, England, has obtained options on a number of claims in Gillies Limit.

Silver Bar—Milling ore has been encountered on this property, which is under lease to the Preston-East Dome.

Beaver—A new vein has been cut on the 460-ft. level. The mine has been opened on the 700-ft. level, which is the deepest working in Cobalt.

McKenzie—Manager J. H. Dixon, of this property in the Elk Lake district, has ordered a boiler and a six-drill compressor.

Mann—At this mine in the Gowganda district, 20 tons of 3000-oz. ore is now sacked, awaiting shipment over the winter roads, and 2000 tons of mill ore, averaging 40 oz., is on the dump.

Chambers-Ferland—The provincial government has discontinued the exaction of a royalty of 25% on the gross output of this mine, beginning Jan. 1, 1913, until such time as the company is able to pay a yearly dividend of 10%.

Casey Cobalt—The new mill is treating 25 tons of ore daily, and there is enough ore on the dump to keep it going at that rate for nearly two years. The ore so far treated has averaged about 40 oz. per ton.

Nipissing—During October, ore was mined of an estimated value of $99,040. Ore estimated to be worth $322,640 was shipped. The production for the month was small on account of it being necessary to shut down No. 73 sorting house, while alterations were being made to have it serve as a terminal for the aërial tram. Development during the month was satisfactory.

Ontario-Porcupine

Edwards—A good surface discovery has been made on this property.

Maidens—These Deloro properties are being examined for the Hudson Bay Mines, Ltd., Cobalt.

Hollinger Reserve—The main vein has been cut at the 200-ft. level.

Bewick-Moreing—Assessment work on these claims, adjoining the Foley-O'Brien, has opened up a large shoot showing high-grade ore. No announcement has been made as to the plans of the company in regard to development.

McEnaney—Up to the time when work was suspended by the strike the ore blocked out was estimated to be worth $800,000. On the 300-ft. level there is an oreshoot 150 ft. long, and 5 ft. wide.

Ontario Gold Wonder—This company, chartered under the laws of North Dakota, holding five claims in Otto and Boston townships, Swastika mining district, has been petitioned in bankruptcy in Boston by its creditors.

Mexico

Baja California

El Promontorio—This sulphur mine, near the head of the Gulf of California, has been optioned to American men and the examination by the engineers has been made.

Sonora

Lucky Tiger-Combination—During October bullion, ore and concentrates worth $157,332 were produced from 6514 tons of ore and 1583 tons of old dump tailings. The estimated profit was $77,840.

Spain

According to recent reports there is a feeling of unrest among the Rio Tinto miners and it is believed that a strike is imminent.

The Market Report

Current Prices of the Metals, Minerals, Coal and Mining Stocks

Coal Trade Review

New York, Nov. 27—The coal situation in the West is easing up a little and supplies are more plentiful. The weather has been exceptionally mild almost everywhere. Another week will see the end of the Lake movement, releasing more cars for general traffic.

The seaboard bituminous trade is still suffering from scarcity. This is especially the case in the coastwise trade, where the usual rush is on to supply the shoalwater ports in New England before ice makes. The West Virginia situation is improved and there is a prospect of an end to the strike.

Anthracite shipments are slowly catching up with demand, but the companies are still behind on deliveries. The investigation of anthracite rates in Philadelphia is bringing out a lot of evidence against the companies.

Coal and coke carried over all lines of Pennsylvania R.R. east of Pittsburgh and Erie, 10 months ended Oct. 31, short tons:

	1911	1912	Changes
Anthracite	9,581,057	8,358,717	D. 1,222,340
Bituminous	34,551,595	38,227,609	I. 3,676,014
Coke	8,814,649	10,882,963	I. 2,068,314
Total	52,947,301	57,469,289	I. 4,521,988

The total increase this year was 8.5%. The largest proportional gain was in coke.

British Fuel Exports—Exports of fuel from Great Britain, with coal sent abroad for use of steamships in foreign trade, 10 months ended Oct. 31, long tons:

	1911	1912	Changes
Coal	53,257,450	52,550,191	D. 707,259
Coke	837,891	803,011	D. 34,880
Briquettes	1,347,495	1,252,007	D. 95,488
Total exports	55,442,836	54,605,209	D. 837,627
Steamer coal	16,017,616	15,020,522	D. 997,094
Total	71,460,452	69,625,731	D. 1,834,721

Imports of coal for the 10 months were 18,572 tons in 1911, and 187,043 in 1912; increase, 168,471 tons.

Iron Trade Review

New York, Nov. 27—No diminution is apparent in the general activity of the iron and steel trades, and business continues on a large scale. No price changes of importance are noted on finished material.

Railroad buying has again been on a large scale. It has included equipment, bridge work and rails. The result of the bridge and car orders is seen in a heavy business in plates and shapes. Bars are in strong demand and mills are full of work, including some which had been closed, but are now able to run at a profit. The rail mills are almost full for next year, and orders are still coming in, including several for export. Structural steel is rather quiet, as is to be expected at this season.

Pig iron continues active and orders have been freely placed for foundry and basic grades, while inquiries are numerous. Makers are holding firmly to the higher prices already made, as was to be expected from the advance of about 20% in Lake ore prices and 30% on coke. These mean an increase of at least $1.50 in the cost of raw material for a ton of iron.

There is much complaint of delays in shipping material, owing to short supply of cars. The labor question is also rather a serious one at many points. At the Carnegie Steel Works a strike of the switchmen and yardmen is causing much trouble, the mills being held up by the failure to deliver material to them. This delay is rather serious at the present time.

Steel Corporation Suit—The taking of testimony in the government suit against the Steel Corporation has been adjourned for a month. A great many witnesses have been examined; some of their evidence was interesting, but cannot be said to have added anything important to what was already known.

Baltimore

Nov. 25—Exports for the week included 115,600 lb. steel rails, 55,900 lb. splice-bars, 112,024 lb. wire, 673,640 lb. skelp steel and 947,000 lb. steel billets to Glasgow, Scotland. Imports included 305 tons ferromanganese and 775 tons manganese ore from Liverpool; 20,510 tons iron ore from Cuba.

Birmingham

Nov. 25—Considerable pig iron was sold recently by Southern manufacturers for export. The product is to be shipped as quickly as transportation can be arranged. Other sales of iron are reported and the month's business promises to stack up well. The quotations range from $14.25 to $15 per ton, No. 2, foundry immediate delivery iron brings the first named price while the first quarter of 1913 will see iron moving at $14.50 and after that period $15 will be the quotation. The furnaces in blast continue to produce steadily. The new year promises to come in with a tonnage sold ahead in Southern territory that will require steady delivery for at least six months. Basic iron is in good demand. In addition to local consumption, there is a good demand for basic pig elsewhere.

There is continued activity at steel plants in Southern territory, in fact, all plants, large and small alike, are doing well with plenty of orders in hand. Cast-iron pipe production, sales and delivery are about as good as could be asked for.

There are prospects of an early adjudication of affairs of the Southern Iron & Steel Co. and the Alabama Consolidated Coal & Iron Co., which are in the hands of trustees. The reorganization of the first named company is being handled in New York, while the Alabama Consolidated is being placed on its feet at Baltimore.

While coke prices and coke production are attracting attention here as well as elsewhere, no reports are to be heard that there is any interruption because of a shortage of supply.

Chicago

Nov. 26—Sales of pig iron have somewhat slackened in the last week; the demand for iron and steel products continues large and steady. The buying of pig iron in small lots is attributed chiefly to the fact that many of the chief melters are supplied for the first quarter and some well up to the close of the first half; their buying is for mixtures and for special requirements. Furthermore, there is the feeling that the first of the year is approaching and the buying of pig iron naturally falls off previous to that date.

Prices remain nearly the same; Northern iron has stiffened a little, the minimum for the last week having been $18 at furnace, making the delivered price about $18.50, while $18.25 at furnace is now being asked. Southern remains at $14, Birmingham, or $18.35, Chicago, with some sales at 25@50c. higher. No differences are being made between sales for early delivery and for first-half delivery. Charcoal iron is in light demand and firm at $18.75, Chicago.

In the market for finished products the problem continues to be to assure deliveries in time for needs. Railroad buying is on a large scale; the roads are generally replacing old track and equipment with new and the volume of busi-

ness promises to be large for several months. Structural material is in lighter but steady demand for a wide range of territory, and the question of deliveries is the most important in the trade. Bars are strong, both iron and steel being in large demand at higher prices than for many months; plates, sheets and wire products are in great demand; minor lines show similar demand and difficulty of supply.

Cleveland

Nov. 25—There has been a lively week in the ore market, as noted elsewhere. Shipments from docks are still delayed by car shortage.

Pig Iron—Business is active and the market is very strong. Basic iron is in short supply. Deliveries from furnaces are slow, owing to short supply of cars. Quotations, Cleveland delivery, are $18.15 for bessemer, $16.50@16.75 for basic, $17.50@18 for No. 2 foundry and $19.50 for Lake Superior charcoal.

Finished Material—Some good contracts for structural steel have been let. Demand for plates and bars is heavy.

Philadelphia

Nov. 27—Urgent inquiries continue to strengthen iron for future delivery, and the sales for the past week have been made at full asking prices. The higher grades of foundry are most urgently wanted for delivery throughout the first half of next year. Southern irons are once more moving quite freely and forge iron is more active than for months. Low-grade foundry for pipe purposes has been purchased for forward delivery in large lots at full prices. The uncertain supply of coke with pending advances is causing much concern in furnace quarters, and at some furnaces the supply of labor is short. The feature of the week has been the contracting for or the inquiring for large supplies of various kinds of pig iron, including special grades of foundry and low-phosphorus iron for delivery extending in a few cases far into next year. Quotations may be fairly given at $18.50 for No. 2 X foundry, $17.75 for gray forge, $18.50 for basic and $24 as a bottom price for low phosphorus.

Steel Billets—Steel billets are quoted as a minimum for openhearth at $32, but more money has been paid this week and inquiries to hand yesterday and today indicate that purchasers are at the mercy of makers. Forging billets are quoted at $35 as an inside price.

Bars—Urgent buyers of bars have paid as high as 2c. at mills for ordinary bars, though the nominal quotation, delivered, is 1.67½c. Prices gravitate between these two extremes. Current figures are making it possible for some idle capacity to resume and this may be attempted early in the year. Steel bars command 1.85@1.95c. The bar mills are now figuring upon some large contracts.

Sheets—The sheet mills have scarcely any capacity to spare and premiums which for weeks past have been paid for only early delivery are now being offered for later delivery.

Plates—The monotonous activity in orders for steel plates is still to be reported. Much of the business is still done on a premium basis.

Structural Material—The heaviest orders come from railroad sources.

Scrap—Scrap is selling as fast as it can be delivered, especially heavy melting steel, railroad scrap, yard scrap and heavy cast scrap.

Pittsburgh

Nov. 26—The announcement of the Lake Superior ore prices for the season of 1913, as noted in last issue, has apparently had no influence upon the general iron- and steel-market situation. An advance over the relatively low basis which prevailed for the season of 1912 was such a foregone conclusion as to have been practically discounted in the pig-iron market. A large part of the pig-iron advance is equalized from the furnace standpoint by the advance in coke, Connellsville coke having sold for the first half of next year at from $2.50 clear up to $3.50, against sales for the current half year at $2.15@3.40, and sales made last November for the first half of this year at $1.55 to $1.65 at ovens.

The position of the finished-steel markets is one of considerably decreased buying, as compared with last week or previous weeks, but of undiminished pressure upon the mills for deliveries of material already sold, this being chiefly relatively low-priced material, at from $3 to $5 a ton below the present general market, above which market premiums of from $2 to $4 a ton are being obtained for fairly prompt deliveries. In some quarters the reduced buying for forward delivery is attributed to fears that tariff revision will eventually depress business, and to the near approach of the end of the year, when business is normally dull, but in other quarters it is represented that heavy buying could not be expected to continue, since nearly all the business for the next seven months is already covered.

The local mills of the United States Steel Corporation are filled up, as to the majority of their products, for fully six months ahead, and in some lines current sales are chiefly for third-quarter delivery. The corporation has followed the policy of being very reserved in taking blanket contracts for steel products, cutting down the buyers' estimates of requirements heavily, but of selling freely against specific jobs, even though the delivery period runs far into the future, and holding to prices of not over 1.45c. on plates and shapes in such cases, although the independents usually, if not invariably, quote 1.50c. as a minimum.

Pig Iron—The pig-iron market has been quiet since the heavy sales of steel-making iron reported a week ago, and which advanced basic to $16.50, Valley, and bessemer to $17.25, Valley. The prediction made several weeks ago is now made afresh that basic is likely to cross bessemer in price, as there is a continuous demand for basic, while bessemer is bought by the large steel works only upon occasion. We quote, at Valley furnaces, 90c. higher, delivered Pittsburgh: Bessemer, $17.25; basic, $16.50; No. 2 foundry, $17@17.50; forge, $16.75@17; malleable, $17@17.25 per ton.

Ferromanganese—While the contract price of $61, Baltimore, is still quoted for deliveries over the second half of next year, there is no first-half material available at this figure, and prices are somewhat uncertain, as very little material is offered. We quote the market approximately as follows: Prompt, $75@80; first quarter, $65@70; second quarter, $62.50@65; last half, $61, f.o.b. Baltimore.

Steel—The advanced prices quoted last week on billets and sheet bars have become almost entirely nominal, but so little has been done that new prices cannot be quoted. It is reported that a limited tonnage of sheet bars has been sold at $30, which is a new high price on this movement by more than $1 a ton. We repeat last week's quotations, though they may be regarded as practically nominal: Bessemer billets, $27; bessemer sheet bars, $27.50; openhearth billets, $28; openhearth sheet bars, $28.50, f.o.b. maker's mill, Pittsburgh or Youngstown. Wire rods are quotable at $30, Pittsburgh.

Sheets—The sheet mills are very well filled up and the majority of the independents are not quoting, except at premiums over the regular prices of the American Sheet & Tin Plate Co. This interest is now practically sold up through the first quarter, but is selling for second-quarter delivery to manufacturing consumers, and in special cases probably for somewhat later delivery still, its prices being 2.25c. for black, 3.40c. for galvanized and 1.65c. for blue annealed, for such deliveries as it can make. Sales to jobbers have been made only for first quarter, by either the leading interest or the independents. Occasionally some of the independents are booking contracts at 2.25c. and 3.40c., but as a rule they refuse to sell at all. We quote: Black sheets, 28 gage, 2.25@2.35c.; galvanized, 28 gage, 3.40@3.60c.; blue annealed, 1.65@1.75c.; painted corrugated, 28 gage, 2.45c.; galvanized corrugated, 3.45c. per pound.

St. Louis

Nov. 25—The market has been a little quiet on pig iron, though prices remain firm. All producers have enough orders booked to run them for six months and consumers, on the other hand, are fairly well protected. There are a number of small inquiries from widely scattered sources. Producers in general are asking $14.50 Birmingham or $18.35 St. Louis for Southern No. 2 foundry, while Northern iron is in fair demand at around $19 St. Louis.

Coke is scarce and $6.50 is being asked for the best Connellsville foundry. By-product coke is being widely used and is bringing around $6 St. Louis.

Iron Ore Trade

As noted by telegraph last week, Lake ore prices for the season of 1913 have been fixed at an unusually early date, and with little preliminary negotiation. This action was immediately followed by the placing of large contracts, the total up to date being over 6,000,000 tons. We repeat the new prices, the 1912 rates being given in parentheses: Old Range bessemer, $4.40 (1912, $3.75); Mesabi bessemer, $4.15 ($3.50); Old Range nonbessemer, $3.60 ($3); Mesabi nonbessemer, $3.40 ($2.85). The base continues the same as to iron contents. The prices are for ore delivered at Lake Erie ports. It must be remembered that there has been a reduction of 20c. in the railroad charges from the mines to the upper lake ports since last season.

United States Foreign Trade

Exports and imports of iron and steel and of machinery in the United States for nine months ended Sept. 30, are valued as below by the Bureau of Foreign and Domestic Commerce of the Department of Commerce and Labor:

	1911	1912	Changes
Exports	$178,938,598	$213,699,572	I. $34,760,974
Imports	22,220,521	21,111,860	D. 1,108,661
Excess, exp.	$156,718,077	$192,587,712	I. $35,869,63

Increase in exports this year, 19.4%; decrease in imports, 5%. The leading articles of iron and steel were, in long tons:

	Exports		Imports	
	1911	1912	1911	1912
Pig iron	95,325	193,979	115,874	89,557
Scrap	62,012	78,721	14,371	13,114
Billets, blooms, etc.	181,178	224,446	23,245	13,721
Bars	109,828	166,035	20,840	11,624
Rails	349,942	353,120	684	2,854
Sheets and plates	252,281	407,082	1,688	2,631
Structural steel	158,457	217,345	627	1,874
Wire-rods	12,730	48,180	12,129	10,736
Wire	158,602	187,234	.....	.....
Nails and spikes	53,026	74,534	.....	.....
Tinplates	42,557	66,722	12,869	1,502
Pipe and fittings	153,746	192,316	.....	.....

Imports of wire not reported in quantities; values were $991,655 in 1911, and $813,543 in 1912. Exports of mining machinery were valued at $5,143,394 in 1911, and $5,571,353 this year.

METAL MARKETS

New York, Nov. 20—The metal markets have been generally active, but without any special incident.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal	Exports	Imports	Excess
Gold			
Oct. 1912	$ 330,270	$ 11,887,492	Imp. $11,557,222
" 1911	3,983,994	4,102,427	Imp. 118,433
Year 1912	44,058,544	50,677,285	Imp. 6,618,741
" 1911	22,247,304	49,279,533	Imp. 27,032,229
Silver			
Oct. 1912	6,171,820	4,683,784	Exp. 1,488,036
" 1911	5,087,087	3,404,458	Exp. 1,682,629
Year 1912	58,519,766	40,985,536	Exp. 17,534,230
" 1911	54,615,048	37,100,888	Exp. 17,514,160

Exports from the port of New York, week ended Nov. 23: Gold, $25,470; silver, $979,645, principally to London. Imports: Gold, $811,494; silver, $241,957, chiefly from Mexico, the West Indies and South America.

Gold—Prices on the open market in London remained at the usual level, 77s. 9d. per oz. for bars and 76s. 4d. per oz. for American coin. Of the supplies arriving, $750,000 were taken for export to New York.

Iridium—This metal is still quoted at $67@70 per oz., New York.

Platinum—The market has been rather more active, but prices are unchanged. Dealers here still ask $45.50 per oz. for refined platinum and $48 per oz. for hard metal.

The Russian government order prohibiting exports of crude platinum after Jan. 1 is much discussed, especially by the refiners in France and Germany. The object, of course, is to compel the establishment of refining works in Russia. It is not yet certain that the order will be enforced on that date.

Silver—The market continues steady; the future price depends on the attitude of the Indian government in regard to purchases for coinage purposes. The situation may develop in December.

SILVER AND STERLING EXCHANGE

Nov.	21	22	23	25	26	27
New York	62⅞	63	63	63	63	63
London	29⅛	29⅛	29⅛	29⅛	29⅛	29⅛
Sterling Ex.	4.8480	4.8490	4.8500	4.8495	4.8475	4.8455

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

Exports of silver from London to the East, Jan. 1 to Nov. 14, as reported by Messrs. Pixley & Abell:

	1911	1912	Changes
India	£7,722,600	£9,434,500	I. £1,711,900
China	990,300	1,377,000	I. 386,700
Total	£8,712,900	£10,811,500	I. £2,098,600

Exports of gold to India for the month ended Nov. 14 were £749,000 in all.

Copper, Tin, Lead and Zinc

NEW YORK

Nov.	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.
21	17¼ @17¾	17.40 @17.45	49⅛	4.50	4.35	7.35 @7.40	7.20 @7.25
22	17¼ @17¾	17.35 @17.40	49⅝	4.47½ @4.50	4.32½ @4.35	7.30 @7.35	7.15 @7.20
23	17¼ @17¾	17.35 @17.40	49⅝	4.47½ @4.50	4.32½ @4.35	7.30 @7.35	7.15 @7.20
25	17¼ @17¾	17.35 @17.40	49⅜	4.47½ @4.50	4.32½ @4.35	7.30 @7.35	7.15 @7.20
26	17¼ @17¾	17.35 @17.40	49¾	4.47½ @4.50	4.32½ @4.35	7.27½ @7.32½	7.12½ @7.17½
27	17¼ @17¾	17.35 @17.40	49⅞	4.47½ @4.50	4.32½ @4.35	7.25 @7.30	7.10 @7.15

The quotations for copper, lead, spelter and tin are for wholesale contracts with consumers, without distinction as to deliveries; and are representative, as nearly as possible, of the bulk of the transactions, reduced to basis of New York, cash, except where St. Louis is specified as the basing point. The quotations for electrolytic copper are for cakes, ingots and wirebars. The price of electrolytic cathodes is usually 0.05 to 0.10c. and that for casting copper usually about 0.125 to 0.2c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market for good ordinary brands, both desilverized and non-desilverized; specially refined corroding lead commands a premium. The quotations on spelter are for ordinary Western brands; special brands command a premium.

LONDON

Nov.	Copper			Tin		Lead, Spanish	Zinc, Ordinaries
	Spot	3 Mos	Best Sel'td	Spot	3 Mos		
21	77⅛	78⅛	83⅛	226½	227	18	26½
22	77⅛	78⅛	83¼	226¾	227	18	26½
23	....	....	....	.....	.....	....	....
25	76¾	77½	82¾	225¾	226	18	26½
26	76⅞	77⅛	82¾	226¾	226¾	17⅞	26
27	76⅞	77⅛	82¼	225½	225½	17⅛	26

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17½c.; £15 = 3.26c.; £25 = 5.44c.; £70 = 15.22c. Variations, £1 = 21¾c.

Copper—Since Nov. 20 the market has been extraordinarily dull. There has been little or no demand from Europe. Some small lots of electrolytic copper have been placed with consumers in Connecticut at 17.40c., cash, New York, and 17½c., delivered, 30 days, corresponding to about 17.35c., cash, New York. Such business has been done both by first hands and second hands. Electrolytic copper at 17½c., delivered, 30 days, has

been freely offered all through the week. However, the larger agencies adhere firmly to their old price of 17¾c., although buyers at present will not pay it. The market for Lake copper during the week has been rather nominal. Some trifling lots of special brands have realized as high as 17¾c., but good Lake copper is obtainable at 17⅝c., or less. Notwithstanding the continued aloofness of the manufacturers and their adoption of a hand-to-mouth policy in buying, it is believed in some well informed quarters that their supplies are low and that the inauguration of an important buying movement will quickly absorb the copper that is now for sale at concessions. At the close Lake copper is quoted at 17½@17¾c.; electrolytic copper, in cakes, ingots and wirebars, is 17.35@17.40c. Casting copper is quoted nominally at 17.20@17.25c. as an average for the week.

The London market for standard copper has been under the influence of the disturbed political conditions in Europe, and in consequence has been quiet and weakish. On Nov. 21, spot was quoted £77 10s. and three months £78 3s. 9d., and it has eased off until at the close on Nov. 27, spot is quoted at £76 7s. 6d. and three months £77 2s. 6d. per ton.

Copper sheets are 23@24c. per lb., base for large lots; full extras are charged and higher prices for large quantities. Copper wire is 19@19¼c. base, carload lots at mill.

Copper exports from New York for the week were 6278 long tons. Our special correspondent gives the exports from Baltimore at 2979 tons for the week.

Tin—Orders, which at the end of last week were placed from this side in the London market imparted a steadier tone to the latter. Still, the market has lost a good deal of its former buoyancy, and it is argued that the war in southeastern Europe has interfered and will continue to interfere seriously with a considerable consumption of tin in Europe. Buying on this side was satisfactory, most orders being placed at prices below those at which tin can be laid down for shipment from abroad. There is now a plethora of tin in this market, so that spot material is selling lower than futures. The market closes easy at £225 10s. for spot and the same for three months, and about 49⅜c. here for December tin.

The total arrivals of Bolivian tin and concentrates in Europe 10 months ended Oct. 31 were equivalent to 19,294 tons fine tin in 1911, and 17,359 in 1912; a decrease of 1935 tons this year.

Lead—On Nov. 21, the American Smelting & Refining Co. recognized the previous decline in the market by cutting its price to 4.50c., New York. Underselling by competitors was promptly resumed and the metal has been freely offered. There has been slightly more business at the lower level, but in the aggregate the tonnage has not amounted to much. This is the time of the year when purchases of lead are about to be curtailed.

The foreign market is slightly lower, Spanish lead being quoted £17 18s. 9d., and English lead 2s. 6d. higher.

Spelter—The quoted price of £26 in London corresponds to about 5.62c., or about 7.20@7.25c. for European spelter landed in New York, duty paid, or about 7.32½@7.37½c., delivered in Pittsburgh; consequently the importation of foreign spelter was impending, which caused American sellers to weaken and take the small business offered at receding prices. Consumption is good, both in the galvanizing and brass trades, but buyers appear to have covered their immediate wants. At the close St. Louis is quoted 7.10@7.15c.; New York, 7.25@7.30 cents.

The London market for spelter held at £26 10s. until Nov. 26, when it fell to £26, at which figure it closes on Nov. 27. This is for good ordinaries, specials being quoted £26 5s. per ton.

Base price of zinc sheets is $9 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8% discount.

Zinc dust is quoted 7⅝@7¾c. per lb., New York.

Other Metals

Aluminum—There is still a scarcity of aluminum for prompt delivery, for which premiums have to be paid, but contract-tonnages are freely offered at somewhat lower prices. There seem to be some cross-currents in this market. We may generalize the status by the quotation of 25½@26c. per lb., New York.

Antimony—After a brief spell of dullness the market has improved a little, though prices here are slightly below the present cost of import. Current quotations are 10.20@10.50c. per lb. for Cookson's; 9.60@10c. for Hallett's; 8.87½@9.37½c. for Chinese, Hungarian and other outside brands.

Quicksilver—Business has been steady and there are no changes in price. New York quotations are $42 per flask of 75 lb., with 60c. per lb. asked for retail lots. San Francisco, $41.50 for domestic orders and $39 for export. London price is £7 12s. 6d. per flask, with £7 10s. named from second hands.

Cadmium—The latest quotation from Germany is 725@750 marks per 100 kg., f.o.b. works in Silesia. This is equal to 78.27@80.97c. per lb. at works.

Nickel—Shot, blocks and plaquettes bring 40@45c. per lb., according to quality. Electrolytic nickel is 3c. per lb. higher.

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

Zinc and Lead Ore Markets

Platteville, Wis., Nov. 23—The base price paid this week for 60% zinc ore was $55@56.50. The base price paid for 80% lead ore dropped to $52@54 per ton.

SHIPMENTS WEEK ENDED NOV. 23

Camps	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville	809,020	.....	288,000
Mineral Point	793,400	.....	.....
Benton	748,000	144,400	882,600
Highland	316,800	.....	.....
Hazel Green	320,000	.....	.....
Shullsburg	230,000	.....	.....
Galena	146,500	.....	.....
Linden	121,660	.....	80,700
Harker	86,250	.....	.....
Rewey	84,000	.....	.....
Cuba City	77,000	66,400	.....
Montfort	70,000	.....	.....
Total	3,796,630	210,800	1,251,300
Year to date	180,058,800	7,429,760	34,664,710

Shipped during week to separating plants, 2,654,510 lb. zinc ore.

Joplin, Mo., Nov. 23—The high price of zinc sulphide ore is $61, the base range per ton of 60% zinc is $55@58. Zinc silicate brought $30@36 per ton of 40% zinc. The average of all grades of zinc is $54.14. Lead sold on a base of $56 per ton of 80% metal content, and the

SHIPMENTS WEEK ENDED NOV. 23

	Blende	Calamine	Lead Ore	Value
Webb City-Carterville	4,579,700	.....	659,940	$148,998
Joplin	3,229,320	.....	365,100	102,258
Galena	1,110,750	.....	120,300	34,468
Miami	976,100	.....	326,680	32,571
Duenweg	951,080	.....	46,000	27,918
Alba-Neck	848,220	.....	25,750	25,319
Oronogo	624,730	.....	.....	15,568
Carl Junction	476,090	.....	7,930	14,028
Spurgeon	117,310	582,020	22,960	13,080
Cave Springs	326,230	.....	.....	9,134
Jackson	300,380	.....	8,410	8,311
Granby	.....	254,670	48,880	5,320
Aurora	134,160	111,280	.....	5,245
Carthage	149,770	.....	.....	4,043
Wentworth	141,590	.....	.....	3,539
Quapaw	131,200	.....	.....	3,280
Lawton	125,400	.....	.....	3,151
Stott City	60,830	.....	.....	1,520
Totals	14,282,860	947,970	1,631,950	$457,751
47 weeks	513,708,340	32,410,720	84,694,520	$16,699,362

Blende val., the week, $396,949; 47 weeks, $13,770,361
Calamine, the week, 13,423; 47 weeks, 514,070
Lead value, the week, 45,379; 47 weeks, 2,414,931

MONTHLY AVERAGE PRICES

Month	Zinc Ore: Base Price		Zinc Ore: All Ores		Lead Ore: All Ores	
	1911	1912	1911	1912	1911	1912
January	$41.85	$44.90	$40.55	$43.54	$55.68	$58.92
February	40.21	45.75	39.16	43.31	54.46	52.39
March	39.85	51.56	38.45	49.25	54.57	54.64
April	38.88	52.00	37.47	50.36	56.37	54.18
May	38.25	55.30	36.79	53.27	55.21	52.45
June	40.50	55.88	38.18	54.38	56.49	55.01
July	40.75	58.85	38.36	56.59	58.81	58.83
August	42.50	55.13	41.28	53.27	60.74	57.04
September	42.63	59.75	41.29	57.07	59.33	61.26
October	42.38	57.00	40.89	55.97	54.72	63.22
November	45.40	.....	43.25	.....	57.19	.....
December	44.13	.....	40.76	.....	62.03	.....
Year	$41.45	.....	$39.90	.....	$56.76	.....

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.

average price of all grades is $55.62 per ton.

Other Ore Markets

Tungsten Ore—Ferberite, wolframite and huebnerite ores, $6.50@7 per unit per ton of 2000 lb. of ore containing 60½ of tungsten trioxide. For scheelite ore, 50c@$1.50 per unit less. These prices are delivered.

Manganese Ore—Late quotations for manganese ore in Great Britain are, for ores c.i.f. United Kingdom ports; Indian and Brazilian, 50%, 24@25c. per unit; 45%, 22½@23c. Caucasian, 50% manganese, 21@21½c.; 48%, 20½@21c. per unit.

New Caledonia Ores

Exports of ores from New Caledonia, nine months ended Sept. 30, as reported by the *Bulletin du Commerce,* of Noumea, were 51,756 tons nickel ore and 40,937 tons chrome ore. Exports of metals were 3626 metric tons of nickel matte.

Chemicals

New York, Nov. 27—The market is active generally, and the chemical trade is heavy.

Arsenic—Supplies are a little better. Prices are a shade easier, at $5 per 100 lb. for spot and $4.75 for futures.

Copper Sulphate—Trade is good and the market is steady. Prices are unchanged at $5.50 per 100 lb. for carload lots, and $5.75 per 100 lb. for smaller parcels.

Nitrate of Soda—The market is fair and prices are unchanged. Quotations are 2.60c. for spot and for futures up to June next.

Sulphur—The Union Sulphur Works in Brooklyn, N. Y., were destroyed by fire Nov. 25. About 5000 tons of sulphur were burned.

Imports and Exports—Imports and exports of chemicals and fertilizers, including raw materials for chemical manufacture, in the United States for the nine months ended Sept. 30, were as follows:

	Imports	Exports	Excess
Copper sulph. lb.	.....	5,712,696	E. 5,712,696
Copper sul., '11	.....	6,363,886	E. 6,363,886
Bleach, lb.	55,074,235	400	I. 55,073,835
Bleach, 1911	73,370,500	17,368	I. 73,353,132
Potash salts, lb.	469,342,269	2,648,210	I. 466,694,059
Potash salts, '11	496,657,379	2,603,881	I. 494,053,498
Soda salts, lb.	9,053,189	368,270	I. 8,684,919
Soda salts, 1911	18,468,414	406,913	I. 18,061,501
Acetate lime, lb.	.....	58,661,375	E. 58,661,375
Acetate, 1911	.....	59,283,457	E. 59,283,457
Nit. of soda, tons	347,694	6,560	I. 341,134
Nitrate, 1911	427,211	4,379	I. 422,832
Phosphates, tons	.....	927,922	E. 927,922
Phosphates, '11	.....	968,634	E. 968,634
Sulphur, tons	22,056	41,123	E. 19,067
Sulphur, 1911	16,919	23,793	E. 6,874
Pyrites, tons	690,338	.....	I. 690,338
Pyrites, 1911	772,416	.....	I. 772,416
Magnesite, lb.	160,129,446	1,928,013	I. 158,201,433
Magnesite, 1911	197,616,774	1,707,775	I. 195,908,999
Sul. ammonia, lb.	67,236,038	357,600	I. 66,878,438
Sul. am'nia, '11	132,443,260	.....	I. 132,443,260
Arsenic, lb.	4,199,361	650	I. 4,198,713
Arsenic, 1911	3,642,697	3,684	I. 3,639,011

Exports include reëxports of foreign material. Estimating sulphur contents of pyrites the total quantity of sulphur imported this year was 298,190 tons.

Petroleum

The General Petroleum Co., of California, has arranged to buy the stocks of the Union Provident Co. and the United Petroleum Co., which control the Union Oil Co. The sale is said to be on the basis of $130 per share.

Mining Stocks

New York, Nov. 27—On Nov. 21 and 22 the Exchange was irregular and depressed, largely under the influence of the foreign markets. On the Curb mining stocks were rather active, with advances in copper shares, but not much change in other stocks.

Nov. 23 the Exchange was rather quiet and disposed to be cautious. The Curb was more active but irregular, some mining stocks showing gains and others losses.

Nov. 24 the Exchange was rather weak, under pressure of uncertain European markets and high rates for call money. The Curb was generally weaker, but there were fair sales of mining stocks, especially coppers, at steady prices.

Nov. 26 and 27 the Exchange continued rather narrow and irregular, under the same influences. The Curb was a little more active, mining stocks being in fair demand. Sales of coppers increased, but prices were variable and irregular.

In New York, Nov. 21, at auction, 92 shares La Dicha Mining & Smelting Co. brought $50 for the lot.

Boston, Nov. 26—The market for mining shares has dwindled to comparatively small proportions and there is a lack of public interest, which, in most cases, has resulted in a lower range of prices. The money disturbance has been partially responsible for this condition of affairs, although rates in Boston have not reached the altitude that they attained in New York, 7% having been the maximum rate so far in Boston. In periods of tight money copper shares are not always considered the best kind of collateral.

Mayflower and Old Colony shares continue well in the fore as market leaders, although they have both lost some of their earlier buoyancy. The former rose $4 to $18, and the latter rose $2.12½ to $11.37½. St. Mary's Mineral Land took on some activity and rose $3 to $53, on the declaration of the third $1 dividend so far this year. This company has declared a total of $21 per share in dividends since 1903.

Butte & Superior, on extra-heavy selling, has fallen $3.75 to $44.25. No explanation followed this decline. The declaration of an extra 50c. dividend by the Nevada Consolidated had no effect on either this or Utah Copper stock. The report of the Shannon Copper Co. for the

COPPER SMELTERS' REPORTS

This table is compiled from reports received from the respective companies, except in the few cases noted (by asterisk) as estimated, together with the reports of the U. S. Dept. of Commerce as to imported material, and in the main represents the crude copper content of blister copper, in pounds. In those cases where the copper contents of ore and matte are reported, the copper yield thereof is reckoned at 95%. In computing the total American supply duplications are excluded.

Company	August	Sept.	October
Alaska shipments.	1,242,836	1,726,715	1,435,235
Anaconda	25,250,000	24,500,000	25,250,000
Arizona, Ltd.	3,260,000	3,340,000	3,200,000
Copper Queen	8,040,424	9,103,861	8,184,575
Calumet & Ariz.	4,514,000	4,462,000	4,404,000
Chino	3,485,278	3,217,369	3,638,500
Detroit	1,882,289	1,881,668	1,934,828
East Butte	1,410,500	1,250,000	.....
Mammoth	1,802,590	1,834,937	.....
Giroux	774,844	1,005,208	.....
Mason Valley	1,384 000	1,200,000	1,563,700
Nevada Con.	6,551,030	5,607,578	850,741
Ohio	620,000	635,000	.....
Old Dominion	2,597,896	2,204,000	2,523,000
Ray	2,902,715	2,978,404	.....
Shannon	1,400,000	1,142,000	1,210,000
South Utah	224,855	225,568	.....
United Verde*	2,500,000	2,750,000	2,750,000
Utah Copper Co.	11,248,992	6,616,887	2,022,352
Lake Superior*	21,000,000	19,250,000	21,500,000
Non-rep. mines*	8,195,156	8,094,792	8,250,000
Total production.	110,211,367	103,025,987	.....
Imports, bars, etc.	23,561,161	25,149,329	.....
Total blister	133,772,528	128,175,316	.....
Imp. in ore & matte	8,544,624	7,142,232	.....
Total American.	142,307,152	135,317,548	.....
Miami†	3,048,750	2,949,150	2,577,750
Brit. Col. Cos.:			
British Col. Copper	941,364	.....	1,013,000
Granby	1,970,388	2,083,118	.....
Mexican Cos.:			
Boleo†	.....	.....	2,612,400
Cananea	4,044,000	3,500,000	4,248,000
Moctezuma	3,229,839	771,844	3,045,667
Other Foreign:			
Cape Cop., S. Africa	.....	678,720	757,120
Kyshtim, Russia	1,400,000	1,750,000	.....
Spassky, Russia	902.720	981,120	.....
Tilt Cove, Newf'd.	.....	.....	86,785
Exports from:			
Chile	8,512,000	6,048,000	8,512,000
Australia	8,064,000	7,616,000	9,520,000
Arrivals in Europe‡	20,200,320	8,518,720	13,771,520

†Boleo copper does not come to American refiners. Miami copper goes to Cananea for treatment, and reappears in imports of blister.

‡Does not include the arrivals from the United States, Australia or Chile.

STATISTICS OF COPPER.

Month	U.S. Refin'y Product'n	Deliveries, Domestic	Deliveries for Export
X, 1911	118,255,442	64,068,307	60,084,349
XI	111,876,601	68,039,776	67,049,279
XII	122,896,697	65,988,474	79,238,716
Year	1,431,938,338	709,611,605	754,902,233
I, 1912	119,337,753	62,343,901	80,167.904
II	116,035,809	56,228,368	63.148,096
III	125,694,601	67,487,466	58,779,566
IV	125,464,644	69,513,846	53.252,326
V	126,737,836	72,702,277	69,485,945
VI	122,315,240	66,146,229	61,449,650
VII	137,161,129	71,094,381	60,121,331
VIII	145,628,521	78,722,418	70,485,150
IX	140,089,819	63,460,810	60,264,796
X	145,405.453	84,104,734	47,621,342

	Visible Stocks		
	United States	Europe	Total
XI, 1911	134,997,642	176,825,600	311,823,242
XII	111,785,188	164,281,600	276,066,788
I, 1912	89,454,695	158,323,200	247,777,895
II	66,280,643	154,851,200	221,131,843
III	62,939,988	141,142,400	204,082,387
IV	62,367,557	136,819,200	199,186,757
V	65,066,029	134,176,000	199,242,029
VI	49,615,643	117,801,600	167,417,243
VII	44,335,004	108,186,000	152,521,004
VIII	50,280,421	113,299,200	163,579,621
IX	46,701,374	113,568,000	160,269,374
X	62 065,587	107,408,000	170,473,587
XI	76,744,964	103,801,600	180,546,564

year ended Aug. 31 was a favorable document.

On the Curb, Butte Central rose to $9.37½ on heavy trading. An initial dividend of 12½c. by the Nevada-Douglas Copper Co., which is thought to be quarterly, brought the price up to $3.87½ per share.

Assessments

Company	Delinq	Sale	Amt.
Alpha Con., Nev.	Nov. 13	Dec. 4	$0.03
Best & Belcher	Nov. 6	Nov. 25	0.05
Buffalo, Ida	Oct. 28	Nov. 28	0.002½
Consolidated Virginia, Nev.			0.15
Crown Point, Nev.	Nov. 11	Dec. 4	0.10
Crown Point, Utah	Nov. 15	Dec. 10	0.01
Echo, Ida	Dec. 11	Jan. 8	0.001
Franklin, Mich.	Oct. 18		2.00
Laclede, Ida.	Nov. 18	Dec. 9	0.003
Hub, Ida.	Nov. 14	Dec. 14	0.001
Hugo, Ida.	Nov. 9	Dec. 9	0.001
Indiana, Mich.	Oct. 16		1.00
Jack Waite, Ida.	Nov. 30	Dec. 21	0.01
Leroy Gold & Copper, Ida.	Nov. 28	Dec. 28	0.002
Mayflower, Ida	Nov. 27	Dec. 27	0.005
Melcher, Utah	Nov. 23	Dec. 12	0.02
Moon Creek, Ida.	Dec. 4	Jan. 4	0.002
National Copper, Ida.	Nov. 15	Dec. 10	0.01
North Star, Ida.	Nov. 30	Dec. 30	0.001
Oneco, Mich.	Oct. 10		1.00
Ophir, Nev.	Nov. 11	Dec. 9	0.15
Rhode Island, Ida.	Oct. 31	Nov. 30	0.00½
Sierra Nevada, Nev.			0.10
Sunshine, Ida.	Oct. 30	Nov. 30	0.001
Tar Baby, Utah	Nov. 2	Dec. 2	0.002½
Yellow Jacket, Nev.	Oct. 30	Dec. 3	0.10

Monthly Average Prices of Metals

SILVER

Month	New York			London		
	1910	1911	1912	1910	1911	1912
January	52.375	53.795	56.260	24.154	24.865	25.887
February	51.534	52.222	59.043	23.794	24.081	27.190
March	51.454	52.745	58.375	23.690	24.324	26.875
April	53.221	53.325	59.207	24.483	24.595	27.284
May	53.870	53.308	60.880	24.797	24.583	28.038
June	53.462	53.043	61.290	24.651	24.486	28.215
July	54.150	52.630	60.654	25.034	24.286	27.919
August	52.912	52.171	61.606	24.428	24.082	28.375
September	53.295	52.440	63.078	24.567	24.209	29.088
October	55.490	53.340	63.471	25.596	24.594	29.299
November	55.635	55.719	.....	25.680	25.649	.....
December	54.428	54.905	.....	25.160	25.349	.....
Year	53.486	53.304	.....	24.670	24.592	.....

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

COPPER

	New York				London, Standard	
	Electrolytic		Lake			
	1911	1912	1911	1912	1911	1912
January	12.295	14.094	12.680	14.337	55.600	62.760
February	12.256	14.084	12.611	14.329	54.974	62.893
March	12.139	14.698	12.447	14.868	54.704	65.884
April	12.019	15.741	12.275	15.930	54.034	70.294
May	11.989	16.031	12.214	16.245	54.313	72.352
June	12.385	17.234	12.611	17.443	56.365	78.259
July	12.463	17.190	12.720	17.353	56.673	76.636
August	12.405	17.498	12.634	17.644	56.266	78.670
September	12.201	17.508	12.508	17.698	55.253	78.762
October	12.189	17.314	12.370	17.661	55.170	76.389
November	12.616	.....	12.769	.....	57.253	.....
December	13.552	.....	13.768	.....	62.068	.....
Year	12.376	.....	12.634	.....	55.973	.....

New York, cents per pound, London, pounds sterling per long ton of standard copper.

TIN AT NEW YORK

Month	1911	1912	Month	1911	1912
January	41.255	42.529	July	42.400	44.519
February	41.614	42.962	August	43.319	45.857
March	40.157	42.577	September	39.755	49.135
April	42.185	43.923	October	41.185	50.077
May	43.115	46.053	November	43.125	.....
June	44.606	45.815	December	44.655	.....
			Av. Year	42.281	.....

Prices are in cents per pound.

LEAD

Month	New York		St. Louis		London	
	1911	1912	1911	1912	1911	1912
January	4.483	4.435	4.334	4.327	13.009	15.597
February	4.440	4.026	4.266	3.946	13.043	15.738
March	4.394	4.073	4.238	4.046	13.122	15.997
April	4.412	4.200	4.262	4.118	12.889	16.331
May	4.373	4.194	4.223	4.072	12.984	16.509
June	4.435	4.392	4.292	4.321	13.260	17.588
July	4.499	4.720	4.397	4.603	13.530	18.544
August	4.500	4.569	4.406	4.452	14.260	19.655
September	4.485	5.048	4.356	4.924	14.744	22.292
October	4.265	5.071	4.139	4.894	15.332	20.630
November	4.298	.....	4.181	.....	15.821	.....
December	4.450	.....	4.332	.....	15.648	.....
Year	4.420	.....	4.286	.....	13.970	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month	New York		St. Louis		London	
	1911	1912	1911	1912	1911	1912
January	5.452	6.442	5.302	6.292	23.887	26.642
February	5.518	6.499	5.368	6.349	23.276	26.661
March	5.563	6.626	5.413	6.476	23.016	26.048
April	5.399	6.633	5.249	6.483	23.743	25.644
May	5.348	6.679	5.198	6.529	24.375	25.790
June	5.520	6.877	5.370	6.727	24.612	25.763
July	5.695	7.116	5.545	6.966	25.006	26.174
August	5.953	7.028	5.803	6.878	26.801	26.443
September	5.869	7.454	5.719	7.313	27.750	27.048
October	6.102	7.426	5.951	7.276	27.256	27.543
November	6.380	.....	6.223	.....	26.795	.....
December	6.301	.....	6.151	.....	26.849	.....
Year	5.758	.....	5.608	.....	25.281	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PIG IRON AT PITTSBURG

	Bessemer		Basic		No. 2 Foundry	
	1911	1912	1911	1912	1911	1912
January	$15.90	$15.12	$14.40	$13.32	$14.75	$14.00
February	15.90	15.03	14.50	13.28	14.81	14.01
March	15.90	14.95	14.65	13.66	14.96	14.10
April	15.90	15.13	14.65	13.90	15.00	14.15
May	15.90	15.14	14.30	13.90	14.72	14.12
June	15.90	15.15	14.06	14.11	14.56	14.22
July	15.90	15.15	14.03	14.38	14.53	14.38
August	15.90	15.43	14.00	14.90	14.47	14.85
September	15.90	16.86	13.57	16.03	14.40	15.63
October	15.43	17.90	13.44	17.18	14.34	17.22
November	14.92	.....	13.30	.....	14.25	.....
December	15.15	.....	13.10	.....	13.90	.....
Year	$15.72	.....	$13.94	.....	$14.49	.....

STOCK QUOTATIONS

COLO. SPRINGS Nov. 26

Name of Comp.	Bid.
Acacia	.04⅜
Cripple Cr'k Con.	.01½
C. K. & N.	.16½
Doctor Jack Pot	.06½
Elkton Con.	.65½
El Paso	6.05
Findlay	.04½
Gold Dollar	.18
Gold Sovereign	.02½
Isabella	.20½
Jack Pot	.05
Jennie Sample	.06
Lexington	.006
Moon Anchor	.01
Old Gold	.03½
Mary McKinney	.74½
Pharmacist	.01½
Portland	1.05⅜
Vindicator	.88
Work	.01½

SALT LAKE Nov. 26

Name of Comp.	Bid.
Beck Tunnel	.08½
Black Jack	.10½
Cedar Talisman	.00½
Colorado Mining	.18
Columbus Con.	.11
Crown Point	.04
Daly-Judge	6.15
Grand Central	.82
Iron Blossom	1.30
Little Bell	.25
Lower Mammoth	.04½
Mason Valley	11.50
May Day	.20
Nevada Hills	1.30
New York	.005
Prince Con	1.65
Silver King Coal'n	3.15
Sioux Con.	.02¾
Uncle Sam	.10
Yankee	.10

TORONTO Nov. 26

Name of Comp.	Bid	Name of Comp.	Bid
Coniagas	7 75	Foley O'Brien	‡.25
Hudson Bay	60.00	Hollinger	14.95
Temiskaming	.43½	Imperial	.03½
Wettlaufer-Lor.	.25½	Pearl Lake	.24
Am. Goldfield	‡.40	Porcu. Gold	.18
Apex	.01½	Preston E. D.	.04½
Crown Chartered	.02⅝	Rea	.34
Dobie	‡.25	Standard	‡.00½
Dome	20.25	Swastika	.08½
Dome Exten.	.09½	West Dome	‡.13

SAN FRANCISCO Nov. 26

Name of Comp.	Clg.	Name of Comp.	Bid
COMSTOCK STOCKS		MISC. NEV. & CAL.	
Alta	.05	Belmont	8.42½
Belcher	.34	Jim Butler	.62
Best & Belcher	.05	MacNamara	.18
Caledonia	.90	Midway	.30
Challenge Con.	.02	Mont.-Tonopah	1.95
Chollar	.03	North Star	.28
Confidence	.40	West End Con.	1.32½
Con. Virginia	.36	Atlanta	.12
Crown Point	.45	Booth	.05
Gould & Curry	.01	C.O.D. Con	.05
Hale & Norcross	.10	Comb. Frac	.07
Mexican	1.65	Jumbo Extension	.28
Occidental	.70	Pitts.-Silver Peak	.80
Ophir	.41	Silver Pick	.06
Overman	.40	St. Ives	.30
Potosi	.04	Tramp Con.	.02
Savage	.08	Argonaut	‡2.00
Sierra Nevada	.20	Bunker Hill	‡4.50
Union Con.	.27	Central Eureka	.15
Yellow Jacket	.30	So. Eureka	1.50

N. Y. EXCH. Nov. 26

Name of Comp.	Clg.
Amalgamated	84¾
Am. Agri. Chem.	56
Am.Sm.&Ref.,com	79¾
Am. Sm. & Ref., pf.	106
Am. Sm. Sec., pf. B	85½
Anaconda	43
Batopilas Min.	1⅝
BethlehemSteelpf	69
Chino	47
Federal M. & S., pf.	44⅝
Goldfield Con.	2
GreatNor.,ore,,ctf.	45½
Guggen. Exp.	55¾
Homestake	99
Inspiration Con.	20
Miami Copper	27
Nat'nalLead,com.	61¼
National Lead, pf.	108½
Nev. Consol.	23
Phelps Dodge	215¾
Pittsburg Coal, pf.	91¾
Ray Con.	22⅛
RepublicI&S,com.	27⅝
Republic I & S, pf.	89¾
SlossSheffi'd,com.	50
Sloss Sheffield, pf.	94
Tennessee Copper	40¼
Utah Copper	63½
U. S. Steel, com.	74¾
U. S. Steel, pf.	111⅝
Va. Car. Chem.	46⅝

N. Y. CURB Nov. 26

Name of Comp.	Clg.
Barnes King	.60
Beaver Con.	.42
Braden Copper	9
B. C. Copper	4½
Buffalo Mines	2 1/16
Caledonia	.40
Con. Ariz. Sm.	1/16
Davis-Daly	2⅛
Diam'field-Daisy	5
Ely Con.	.16
Florence	.69
Giroux	4⅜
Gold Hill Con.	1/16
Greene Cananea	9½
Greenwater	.04
Internat. S. & R.	‡124
Kerr Lake	2 11/16
Keystone	2
La Rose	2¼
McKinley-Dar-Sa.	2¼
Min. Co. of A. new	2⅞
Motherlode Gold	‡.60
Nev. Utah M. & S.	05
Nipissing Mines	8¼
Ohio Copper	1⅜
Pacific Sm. & M.	1/16
Puebla S. & R.	2
South Live Oak	2
South Utah M. & S.	3/16
Standard Oil (Old)	1110
Stand'd Oil of N.J.	390
Stewart	1 13/16
Tonopah	6⅞
Tonopah Ex.	2¾
Tonopah Merger	.81
Tri-Bullion	5/16
Tularosa	1¼
Union Mines	1/16
United Cop., pfd.	10
Yukon Gold	3

LONDON Nov. 27

Name of Com	Clg.
Camp Bird	£1 3s 9d
Dolores	1 10 0
El Oro	0 17 0
Esperanza	2 0 0
Mexico Mines	7 5 0
Oroville	0 5 0
Stratton'sInd.	0 3 1½
Tomboy	1 8 9

BOSTON EXCH. Nov. 26

Name of Comp.	Clg.
Adventure	6
Ahmeek	325
Algomah	3½
Allouez	41¾
Am. Zinc	30½
Ariz. Com., ctfs.	4
Bonanza	.30
Boston & Corbin	5½
Butte & Balak	4
Calumet & Ariz	78
Calumet & Hecla	570
Centennial	19⅛
Cliff	3
Copper Range	56
Daly West	3¾
East Butte	15
Franklin	9¼
Granby	72½
Hancock	25
Hedley Gold	25½
Helvetia	¾
Indiana	16
Island Cr'k, com.	57
Island Cr'k, pfd.	87
Isle Royale	35¾
Keweenaw	2
Lake	29¾
La Salle	5⅛
Mass	6
Michigan	1¾
Mohawk	64
New Arcadian	2½
New Idria Quick.	‡5½
North Butte	35¼
North Lake	3⅞
Ojibway	3
Old Dominion	57½
Osceola	108
Quincy	86
Shannon	14
Shattuck-Ariz.	32¼
Superior	43
Superior & Bost.	2¼
Tamarack	41
Trinity	4¾
Tuolumne	2 11/16
U. S. Smelting	45
U. S. Smelt'g, pf.	50¾
Utah Apex	1 1/16
Utah Con.	11½
Victoria	2⅛
Winona	4
Wolverine	72
Wyandot	1¼

BOSTON CURB Nov. 26

Name of Comp.	Last
Alaska Gold M.	8⅜
Bingham Mines	4½
Boston Ely	1
Boswyocolo	.01
Butte Central	9
Cactus	.08
Calaveras	2⅜
Chief Cons	1 1/16
Corbin	1/16
Cortez	.75
Crown Reserve	3⅜
First Nat. Cop.	1⅞
Majestic	.40
Mazatan	‡⅛
Moneta Porc.	.03
Nevada-Douglas	3½
New Baltic	1½
Oneco	2
Raven Copper	.22
Portsmouth Coal	.06
San Antonio	‡3½
Smokey Dev.	2 1/16
S. W. Miami	5½
South Lake	6½
Trethewey	.30
United Verde Ext.	‡½

‡Last quotation.