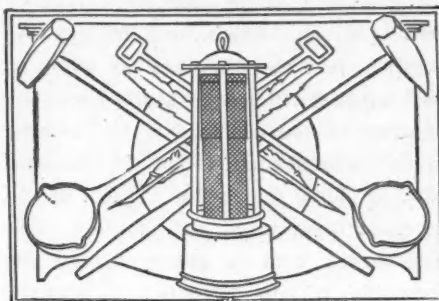


THE ENGINEERING AND MINING JOURNAL

PUBLISHED WEEKLY

By the Hill Publishing Company, 505 Pearl Street, New York • John A. Hill, president; Robert McKean, secretary • London Office, 6 Bouverie Street, London, E. C., German Office, Unter den Linden 71, Berlin, Cable: Engminjour, N. Y. • 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.

VOL. 90

NOVEMBER 5, 1910.

NO. 19

CIRCULATION STATEMENT

During 1909 we printed and circulated 524,500 copies of THE ENGINEERING AND MINING JOURNAL.

Our circulation for October, 1910, was 50,530 copies.

November 5..... 11,000

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

Contents

	PAGE
Editorial:	
More Guggenheim Financing.....	891
Federal Mining and Smelting Company.....	892
The Course of Platinum.....	892
Metallics—By the Way.....	893
Correspondence and Discussion:	
Economic Conditions in the Joplin District... Trachite or Trachyte.....	
Zinc Dust Feeder.....	
Calculation of Recovery in Concentration.....	
Cyanide Development on the Rand.....	894
Nevada Consolidated Copper Company.....	895
Davis-Daly Copper Company.....	895
Consolidated Mining and Smelting Company.....	895
Lackawanna Steel Company.....	895
Details of Practical Mining:	
*Starting a Ventilating Fan Automatically... A Useful Pump Formula.....	
*Method of Extending Shaft Timbers... Top and Bottom Drilling in Pig Copper... Supporting Trolley Wires... Mine Eductors.....	
*Vacuum Filter for Zinc Box Slimes... Carbon Dioxide Criterion... Drill Sharpening Underground.....	
Wages in San Juan Mines, Colorado.....	896
German Miners' Insurance and Annuity Funds—II.....	900
Frederick L. Hoffman.....	901
La Rose Consolidated Mines Company.....	902
Compañía Minera de Peñoles.....	902
*The Züblin System of Ore Chutes.....	
Alfred Gradencitz.....	902
Magnesite Mining in California.....	903
Vanadium in New Mexico.....	903
Oriental Mining Company.....	903
Occurrence of Tungsten in Rand District, Cal.....	904
Samuel H. Dolbear.....	904
Magnetometric Survey of the Adirondack Iron Deposits.....	905
*The Manufacture of Sublimed White Lead.....	906
J. I. Blair.....	906
*Bedded Copper Deposits of Carangas, Bolivia.....	909
Robert Hauchurst, Jr.....	909
Reminiscences of Early Mexican Experiences.....	913
George W. Maynard.....	913
*Mining Methods Employed at Cananea, Mex.—I.....	914
Morris J. Elsing.....	914
*The Dron Shaft Method of Sinking.....	918
Coal Deposits in Brazil.....	919
Making Coke from a Noncoking Coal.....	919
The New Mine Rescue Station in Indiana.....	920
*Anthracite Coal on the Pacific Coast.....	920
Recommended Changes in Indiana Mine Laws.....	921
Lehigh & Wilkes-Barre Coal Company.....	922
Personal, Obituary and Societies.....	923
Editorial Correspondence.....	924
Mining News.....	926
Markets.....	933
Mining Index.....	940
Current Prices of Chemicals, Rare Minerals, Earths, Etc.....	943
Dividends.....	944
*Illustrated.....	

More Guggenheim Financing

A scheme for the further financing of the Guggenheim smelting business is being talked about in the papers. The plan that has been outlined has not been officially announced, and the unofficial disclosure may be simply a *balloon d'essai* to indicate how the public will accept the remarkable scheme that is apparently under meditation.

As appeared from the last annual reports of the American Smelting and Refining Company and the American Smelters Securities Company, the business of the latter has grown in a very remarkable way, its total earnings during the last year have shown an increase of \$1,783,409 over those of the previous year, and amounting in the aggregate to \$7,213,475, a total which was but little short of the \$8,887,788 reported by the Smelting and Refining Company. The financial position of the two companies, however, was widely different. In the conduction of a general smelting business it is necessary to possess a very large capital for carrying the huge quantities of ores and metals through the prolonged process of treatment. Thus, the American Smelting and Refining Company has normally about \$18,000,000 of metals on hand. The Securities Company for its last year reported \$9,714,948. But while in addition to metal stocks, the Smelting and Refining Company had \$11,620,401 in cash and demand loans, with offsetting liabilities to only an insignificant amount, the Securities Company had less than \$1,000,000 in cash, and \$10,816,406 in "net current

liabilities." These liabilities were explained to be "largely advances from American Smelting and Refining Company." Possibly the explanation would have been more accurate if the words "chiefly" or "wholly" had been substituted for "largely."

The position seems to have been that the Smelting and Refining Company had lent nearly the whole of its cash surplus to the Securities Company. It is now proposed that the Securities Company will issue \$15,000,000 of 6 per cent. bonds, convertible into stock at par, which will enable the Securities Company to pay off its indebtedness to the Smelting and Refining Company and add, approximately, \$5,000,000 to its own working assets, with the promise that the Securities Company will soon begin the payment of dividends on its common stock.

The common stock of the Securities Company, amounting to \$30,000,000, is owned by the American Smelting and Refining Company and the Guggenheim Exploration Company, the former having 177,510 shares, which has not heretofore been given any valuation in the assets of the Smelting and Refining Company. Now, it is proposed that the Smelting and Refining Company, when it recovers its loan to the Securities Company, shall buy with the money the Securities stock of the Guggenheim Exploration Company. The amount of the stock to be purchased and the price to be paid for it have not yet been indicated.

The result of this ingenious and elegant scheme will be that the public will supply \$15,000,000 in new money, the Securities Company will add to its re-

sources by about \$5,000,000, at the possible expense of dilution of its capital stock by \$15,000,000 later on; the Smelting and Refining Company will spend its great resource of good, hard cash, the possession of which has heretofore been its best excuse for failure to allow adequately for the amortization of its plants, in the purchase of more of a common stock that up to date itself has refrained from valuation; for its stock of the same kind the Guggenheim Exploration Company will come into possession of real money. By a simple algebraic formula, consequently, it will appear that the public is to be asked to supply a lot of money in order to take over an investment of the Guggenheim Exploration Company, with the American Smelting and Refining Company running the chance of falling down between two stools. If this scheme really be contemplated, we fail to receive the impression of conservative financing.

Federal Mining and Smelting Company

The securities of the Federal Mining and Smelting Company have suffered a further decline during the last week. In looking for the cause of this we need go no further than the recently issued report of the company for its year ended Aug. 31, 1910. Although the usual dividends on the preferred stock were paid, they were not fully earned and the outlook for the future of the mines is admittedly gloomy. The ore reserves of the Wardner mines increased by 41,080 tons, but those of the Mace mines decreased by 33,305 tons, and of the Morning mine by 207,535 tons. At the end of the year the total reserves were 1,092,045 tons against 1,291,805 at the end of the previous year. The amount mined in 1909-10 was 741,650 tons, wherefore the reserves at the end of the year were only about 18 months' supply. The orebodies have not yet been bottomed, except perhaps at Wardner, and additions to the reserves are made from year to year, but such a diminution as occurred last year obviously signifies that the productiveness of these mines cannot long be maintained.

The situation is indeed worse than the figures indicate on their face, inasmuch as the Morning mine, possessing 50 per cent. of the present ore reserves of the company, has suffered such a deterioration in character of ore that it was operated at a

loss last year, while the management estimates only three years' more life for the Wardner mines. The Mace mines are reckoned good for \$50,000 to \$75,000 per month profit as long as they last, but on the 1600-ft. level they are not looking so well as on the 1400-ft., and there is evidently a fear that they are not going to hold out to much greater depth. The management of the company is very strong in its recommendation that the Morning mine be closed rather than exhaust its reserves without profit and that the company ought to move quickly toward the acquisition of new properties. Obviously the present situation of this company is not of a kind to make its stockholders feel good.

With respect to fullness of detail, both technical and financial, the last Federal report is all that could be desired. From this standpoint it is the only decent report that the directors have ever made, wherefore it is the more painful that its substance should be so unsatisfactory. We hardly know whether to congratulate the directors upon having learned the lesson that stockholders have a right to information about their property; or to suspect them of enjoying the grim joke of becoming frank about a patient that could not be bolstered up much longer. We have always been so insistent in urging publicity and the rights of stockholders in general that it is somewhat ungracious to cavil at full reports when finally made, but certainly there is a ground for animadversion when the directors of companies like North Butte and Federal, notoriously secretive for many years, suddenly spring on their stockholders very minute and elaborate reports to tell them that their mines are not good for much more, after the news has been discounted in the stock market by somebody.

The Course of Platinum

It is frequently the case that some of the minor metals do not follow the course of the general market, or of the important metals. An instance of this is found in the range of platinum prices during the present year. In 1909, the metal was at the lowest point it had reached in several years. For nearly half the year it was between \$22 and \$23 per ounce, but in the last quarter it crept gradually up to \$29. At about this time an upward movement began, slowly at first, but the price reached \$33 in July and \$34 in Sep-

tember. In the month just closed, the gain was rapid and the closing quotations are \$39, an advance of nearly 35 per cent. during the year.

The supply of platinum is so small that it is quite possible for it to be cornered; and in fact this has been done several times by the French syndicate which controls most of the Russian output. In the present case, however, there seems to have been a real increase in demand. One call for platinum, its chemical use, does not vary greatly from year to year; moreover in this a large proportion of the metal used is not consumed, but returns in the form of scrap to be remade into chemical ware. Another use, in dentistry, cannot vary largely. In the automobile trade, where platinum is used for sparking points in engines, there has been an actual decrease in the consumption, as compared with last year and the early part of the present year.

The general demand at the present time comes from the jewelry trade, and to this the rise in price is largely due. Fashion has decreed that platinum shall be substituted for gold in certain classes of work, and this has called for a considerable consumption of the metal. This, moreover, is not a use which is likely to be checked by an advance in price since purchasers are usually able to pay for and to demand what they want.

Prices abroad have gone up in about the same ratio, and our latest quotation from St. Petersburg is 31,000 rubles per pound, or \$30.45 per ounce for crude metal, carrying only 83 per cent. platinum. Reports of declining production have helped in the advance. The Russian platinum is the main supply of the market. The receipts from Colombia are irregular and rather unreliable; while the quantities produced in the United States and in some other countries are too small to be taken into account.

It is too early yet to settle the prices of Lake Superior iron for next year, though next month will probably see some decision on this point. It is evident, however, that there must be some reduction, or the merchant furnaces using Lake ore will suffer. The average price of pig in Pittsburg has fallen so that with ore prices unchanged, merchant iron makers will have hard work to make ends meet.

Metallics

The fire loss in the United States annually equals one-half the total cost of new buildings for the year.

One pound of chrome steel in the shoes crushed 2.75 tons of ore at the "700" mill of the Alaska United Gold Mining Company, Douglas Island, Alaska, in 1909, and one pound of iron in the dies crushed 5.86 tons, at a total cost of 2.5c. per ton of ore for iron and steel consumed.

Blasting mats woven of heavy rope are sometimes spread on the ground above bore holes when blasting is being done where flying pieces of rock will be dangerous. If heavy charges are used it is sometimes well to place logs or railroad ties directly over the holes, covering these with blasting mats.

The solid matter in a dense, black smoke has been determined as but one-third of one per cent. of the weight of coal burned. Of this solid matter, probably one-half was carbon. It is not the smoke itself which causes poor economy, but it indicates the presence of unburned gases, such as carbon monoxide and various hydrocarbons.

When a powder magazine is protected by a lightning-rod system, the latter should lead to a ground plate outside of the foundation walls of the magazine. It is not necessary to set these ground plates at any appreciable distance away from the foundation walls, but it is important to bury them below the permanent moisture line of the ground.

Zirconia sand, containing 85 to 90 per cent. of ZrO_2 , is now obtained in commercial quantity from Brazil, and comparatively cheaply. It is an exceedingly refractory substance. Crucibles made of nine parts zirconia and one part magnesia, with 10 per cent. of phosphoric acid as binding agent, are of extraordinary resistance to sudden changes of temperature and practically unaffected by molten alkalis. Pure fused zirconia may be plunged white hot into cold water without fear of fracture.

A report by Gibb Maitland, Government geologist of Western Australia, describes the new radium mineral pilbarite, found in a tantalite lode near Wodgina in the Pilbarra goldfield. The mineral occurs in nodules from the size of a pea up to that of a walnut and is thought to be a hydrous pseudomorph after a probably anhydrous parent mineral. The interior of the nodules is a bright canary-yellow color, the exterior being disguised somewhat by a brownish or reddish coating. The hardness ranges from 2.5 to 3 and its specific gravity from 4.4 to 4.7. It is a hydrated silicate of lead, uranium and thorium, and is estimated to contain about 7.5 cg. of radium per ton.

By the Way

In one of the South African mining papers, bids are invited for the supply of donkeys to several school boards. In this country the donkeys that get on the school boards manage the thing themselves.

Some recent events in the New York curb market inspired the *Evening Post* to remark that "on the Curb, where many people prefer to lose their money, the little tables are insecure, and often get upset, but no operator ought ever to lose the pea."

The Anderson Artificial Coal Company, organized to manufacture coal from clay and chemicals, has passed into the hands of a receiver—the fiasco of a scheme that was expected to develop into a bonanza. One of the many stockholders, a woman, recently judged insane, suffered from a hallucination in which she constantly studied the formula from which the artificial coal was to be made.

An Australian contemporary gives some interesting practices in "high grading," which include the following. Candles are hollowed out, and rich specimens concealed in them. Holes are drilled by the blacksmith for his friends in the heads of the picks. Hollow boot heels are popular. Most ingenious of all, a cyanide workman used to fill his bicycle pump with unprecipitated solution in order to run a private precipitation plant at home.

Rather an odd suit against a California mining company is that of Edward A. Reynolds, claiming damages of \$25,000 for the death of his son by an explosion, though the boy was not an employee of the company. Reynolds charges that the New Guadalupe Quick-silver Mining Company was negligent when it allowed dynamite to lay about where it could be found by small boys. The boy found some dynamite and caps, and then hammered them with a rock until an explosion occurred, resulting in his death.

In the Superior court of Shasta county, California, judgment has been given in favor of the Pittsburg & Mount Shasta Gold Mining and Milling Company against Edward McGrew, a former superintendent. While employed by the company he was instructed to locate several copper claims near the Iron Mountain and Hornet mines of the Mountain Copper Company. He did this in his own name (though the company paid all the expenses), and later refused to deed the claims to the company, which brought suit. The judgment is that he must deed to the company the claims he located in 1909. The judgment was by default, McGrew never appearing to contest the action.

A special news bulletin from Washington to the *New York Times*, Nov. 1, 1910, states that the Right Honorable James Bryce, the British ambassador, has been geologizing in the Culebra cut of the Panama Canal. The ambassador is quoted as describing one particularly interesting rock as "a cross between the usual igneous formations and formations under the influence of water." It is also reported that the President has ordered C. Willard Hayes, chief geologist of the U. S. Geological Survey to proceed to the Canal and make an investigation of these formations. Possibly this diplomatic discovery only existed in the mind of a versatile newspaper representative and it is hoped that it is not so bad as reported. Something certainly should be done quickly before the nations learn what we are harboring at Panama.

The hookworm disease is causing some anxiety among the miners in Amador county, California, where it has been reported to exist in the Kennedy, Zeila, South Eureka and Argonaut mines in and about Jackson. Physicians seem to think it is on the increase and that there are cases in other camps. Nearly all the victims are miners and it is thought that the foreign element is responsible for the introduction of the disease in the country. It is hoped that the Rockefeller Research will soon find a way of eliminating this slothful little fellow. He has already gotten into the vitals of some of our mining stocks, which are floundering around anemically with apparently little hope of developing any Phoenix-like qualities. One or two have shown some signs of healthful activity, but from the manner in which many of them have been helplessly shaken and racked, one might think they had the Wellman equilibrator attachment.

In the Radersburg district of Montana, hot-spring deposits which seem to represent a stage of the mineralization of the producing veins, cap the latter. The hot-spring deposits contain sufficient gold to constitute a discovery for a valid lode location. The surface tufas spreading out from the hot-spring deposits or veins are integral parts of the lodes though lying flat on the surface of Tertiary lake beds, i.e., the tufas are as much a part of the veins in the light of their genesis as are the vertical vents along which the solutions ascended. The question now arises as to whether a location made on the surface tufas without exposing the vertical vents is valid. It is suggested by D. C. Bard in the *Journ. of the Assoc. of Eng. Soc.*, July, 1910, that the tufa has the lake-bed clays for a foot-wall and the sky for the hanging. There is doubtless a nice point at law involved in this question, and it will be interesting to see how the matter will be decided by the Solons of the bench.

CORRESPONDENCE and DISCUSSION

Views, Suggestions
and Experiences of Readers

Economic Conditions in the Joplin District

I have read the interesting article of T. Lane Carter on the "Economic Conditions in the Joplin District," published in the JOURNAL Oct. 15, and enjoyed it thoroughly.

There is one statement, however, that is erroneous, and not with a view of criticizing Mr. Carter, but of giving the facts, I wish to make this explanation. Mr. Carter states that a blende ore (concentrate) carrying 7 per cent. iron will assay 53 per cent. zinc, and in addition be penalized \$6 for the 6 per cent. iron, 1 per cent. being allowed without penalty, making a total of \$13 reduction in the price of the ore. As a matter of fact, a blende ore containing 7 per cent. iron and which has no other gangue impurities will be penalized only \$6 per ton and no more.

JOPLIN PRODUCES HIGH-GRADE CONCENTRATE

Taken as a district there is no higher-grade or more desirable zinc ore produced in the United States than in the Joplin district. The average iron content of the ores of this district, exclusive of the Miami, Okla., camp, will average about 3 per cent. iron and the average grade of the blende ores will assay from 56½ to 57 per cent. zinc. While there are some mines that produce ore carrying higher percentages of iron, they are few, and being in soft ground almost invariably are small and cut no figure in the district's production. One separating plant of small capacity handles all the iron ores of the district, and magnetic separators are not required by the mining operators. The Miami, Okla., ores, amounting to about 5 per cent. of the total production, do contain a high percentage of iron and other impurities, such as bitumen, but the ore of this camp is so rich that it is being worked with great profit, the high royalties of the camp being a greater drawback to profitable mining than the iron content of the ore.

C. H. PLUMB.

Joplin, Mo., Oct. 29, 1910.

Trachite or Trachyte

It has long seemed peculiar to me that, although the names of most rocks and minerals end in *ite*, trachite is commonly spelled with a *y*. The term, it is true,

is from the Greek *trachus*, meaning rough, and the Greek *u* is generally written *y* in English, but, on the other hand, uniformity is always desirable, even in the names of rocks.

The suffix *ite* comes from the Greek *ites*, signifying "of the nature of," among other things, and *yte* is a variant of *ite*. J. D. Dana proposed in 1868 that *ite* be restricted to minerals and *yte* to rocks, but were such usage general, we should have andesyte, dacyte, etc., as well as trachyte. There would, therefore, appear no good reason to make an exception in the case of the last which, to my mind, should be spelled trachite for the sake of uniformity.

GORDON SURR.

San Bernardino, Cal., Sept. 23, 1910.

Zinc Dust Feeder

In the JOURNAL of Sept. 3, 1910, appears an article entitled "Zinc Dust Feeder," by A. B. Parsons, of Goldfield. This article describes minutely our device for feeding zinc dust automatically and proportionately to the Merrill precipitation presses, but the wording is such that the reader will probably infer that this is a local device confined only to the Goldfield Consolidated, Montana-Tonopah, Pittsburg-Silver Peak and other Nevada companies, which are using the Merrill zinc-dust process. On the contrary, this device is supplied by us with each installation and is an integral part of the above patented process.

This device is described in our catalog and is illustrated by a diagram, which is not the same as the one in the article, but is similar.

C. C. Broadwater,
Vice-president, Merrill Metallurgical
Company.

San Francisco, Cal., Oct. 26, 1910.

Calculation of Recovery in Concentration

I wish to draw attention to the fact that the mathematical method of calculating recoveries, written by T. J. Hoover and published in the JOURNAL of June 11, 1910, had been previously fully described by me in an article published in the JOURNAL of June 19, 1909. The formulas given in my contribution were precisely the same as those given by Mr. Hoover, though slightly differently expressed and with different lettering. It appears to me that it would be only fair to make

some acknowledgment of this in the next available issue of the JOURNAL.

London, Oct. 17, 1910. F. CLOSE.

[It is true that certain of Mr. Hoover's formulas are equivalent to those given in Mr. Close's article referred to. However, there are other claimants for priority, antedating Mr. Close, for Ernest Gayford gave equivalent formulas in a publication of the General Engineering Company in 1907, and claims to have used them since 1904, while other engineers have doubtless used similar formulas for some years.

While Mr. Close should be given credit for prior publication in the columns of the JOURNAL, it should be noted that Mr. Hoover's notation is much simpler, and his treatment of the influence of errors far better. As to how important mere simplification of notation is, one need only consider problems in determinants and other higher algebraic studies, where the choice of notation is often enough to decide whether one will or will not be able to solve the problem.

It should also be remembered that when different engineers attack the same problem it is not to be wondered at if they arrive at practically equivalent or even identical formulas. It would be far more surprising if the formulas were unlike, in which case mathematical rules would need an immediate and decided overhauling—EDITOR.]

Cyanide Developments on the Rand

I note in the JOURNAL of Oct. 22, page 797, an account from its Johannesburg correspondent of the Butters filter plant, recently installed at the Crown mines. In his attempt at conciseness he appears to have unconsciously introduced the following statement: "The plant consists of two sections, each of five compartments of 150 leaves, with a filtering area of 81 sq.ft." From my knowledge of the plant shipped to this mine the statement would be clearer as follows: The plant consists of two sections, each contains five compartments and 150 leaves, and each leaf has a filtering area of 81 sq.ft. In other words, the filter plant contains 300 leaves and has a total filtering area of 24,300 sq.ft. (300 times 81).

G. W. SHEPHERD.

Secretary, Butters Patent Vacuum Filter Company.

New York, Oct. 24, 1910.

October Dividends

The accompanying table shows the amount per share and total amount of dividends paid during October, 1910, by a number of the leading mining and metallurgical companies in the United States, Canada and Mexico.

U. S. Mining Companies.	Situation.	Amt. per Share.	Total Amount Paid.
Am. Sm. & Ref. com.	U. S.	1.00	\$ 500,000
Am. Sm. & Ref. pf.	U. S.	1.75	875,000
Am. Zinc, Lead & Sm.	Kan.	0.50	40,060
Anaconda, c.	Mont.	0.50	600,000
Bunker Hill & Sul. s. l.	Ida.	0.30	98,100
Copper Range, c.	Mich.	1.00	384,185
Champion, c.	Mich.	1.00	250,000
Elkton, g.	Colo.	0.01 1/2	37,500
Goldfield, Con. g.	Nev.	0.50	1,779,424
Guggenheim Expl.	U. S.	2.50	519,832
Hecla, s. l.	Ida.	0.02	20,000
Homestake, g.	S. D.	0.50	109,200
New India, q.	Cal.	0.30	30,000
Old Dominion, c.	Ariz.	0.25	73,311
Old Dominion M. & Sm., c.	Ariz.	0.50	81,000
Shattuck Ariz., c.	Ariz.	1.00	350,000
Sioux Con., s. l. g.	Utah.	0.04	29,855
Tonopah-Belmont, s. g.	Nev.	0.15	225,000
Tonopah of Nev., s. g.	Nev.	0.40	400,000
U. S. Sm. Ref. & Min., com.	U. S.	0.50	175,505
U. S. Sm. Ref. & Min., pf.	U. S.	0.87 1/2	425,288

U. S. Industrials.	Situation.	Amt. per Share.	Total Amount Paid.
Central C. & C., com	Mo.	1.50	76,875
Central C. & C., pf.	Mo.	1.25	23,437
Consolidated Coal...	Ill.	1.50	75,000
Consolidation Coal...	Md.	1.50	285,370
General Chem., pf.	U. S.	1.50	150,000
Nat. Carbon, com.	U. S.	1.50	82,500
Nat. Lead, com.	N. Y.	0.75	154,915
Penn. Salt	Penn.	3.00	180,000
Pittsburgh Coal	Penn.	1.25	371,262
Republic I. & S., pf.	Ala.	1.75	357,296
Republic I. & S., ac.	Ala.	1.00	204,169
Sloss-Sheffield, pf.	Ala.	1.75	117,250
Va. Carolina Ch., pf.	U. S.	2.00	360,000

Foreign Mining Companies.	Situation.	Amt. per Share.	Total Amount Paid.
Buffalo, s.	Ont.	0.05	50,000
Crown Reserve, s.	Ont.	0.15	262,500
Esperanza, s. g.	Mex.	0.36	163,800
Hedley, g.	B. C.	0.30	36,000
Jimulco, c.	Mex.	0.02	20,000
La Rose, s.	Ont.	0.10	149,840
Nipissing, s.	Ont.	0.37 1/2	450,000
Trethewey, s.	Ont.	0.10	10,000

Chronology of Mining for October, 1910

Oct. 1—Announcement of the discovery of important bodies of oxidized zinc ore in the Leadville, Colo., mines.

Oct. 3—Explosion due to defective explosives at Palau coal mine, Las Esperanzas, Coah., Mexico, kills more than 70 miners.

Oct. 8—Explosion in coal mine at Starkville, Colo., 60 killed—Chemung mine in New Mexico ceases development temporarily.—Five killed in Rebaje shaft of Sirena mine at Guanajuato by a slide.—First shipment of asbestos from the Wyoming district.

Oct. 10—Fire destroyed the Magna Charta mine buildings at Butte, Mont.

Oct. 15—Announcement of sale of the Hidalgo Mining Company properties, in-

cluding the railroad, at Parral, Chih., Mexico, to an American syndicate headed by A. J. McQuatters for \$1,500,000.—Cottrell fume process inaugurated at Coram, California.

Oct. 18—Four miners killed at Cleveland Cliffs' North Lake iron mine near Ishpeming, Mich.—Explosion in Sigfried potash mine, at Sarstedt, Prussia, kills 15 men.

Oct. 30—Reported that large interests are going into the Porcupine camp.

Oct. 31—Announcement of the sale of the Sinaloa smelting concession to Pacific Smelting and Mining Company of New York.

Nevada Consolidated Copper Company

The annual meeting of the Nevada Consolidated Copper Company was held in Portland, Me., on Nov. 1, 1910. Former president James Phillips, Jr., and C. H. Kuhn resigned from the board of directors, S. R. Guggenheim and J. N. Steele being elected to take their places. The board now consists of Murray Guggenheim, S. R. Guggenheim, S. W. Eccles, C. M. McNeill, Charles Hayden, D. C. Jackling, W. B. Thompson, W. E. Bennett, Judd Stewart, J. N. Steele and W. H. Smith. The first seven are also directors of the Utah Copper Company.

After paying the regular dividend and allowing for depreciation on the Steptoe Valley smelting plant, there remained a net surplus of \$280,308 for the last quarter of the year, and a total surplus of \$2,557,062. The production for the last quarter has been: July, 6,896,429 lb.; August, 6,052,621 lb.; September, 5,151,208 lb.; total, 18,100,258 lb. The ore for these three months averaged 2.26 per cent. copper, and the cost of production is stated to have been 6.8c. per lb. of fine copper, or 7.05c. for the year. The estimated ore reserves amount to 40,360,823 tons averaging 1.70 per cent. copper or 686,133 tons of metal.

Davis-Daly Copper Company

The report for this company owning mines at Butte, Mont., for the year ended June 30, 1910, shows 8209 ft. of development work done on the Colorado shaft with some promising ore discovered on the 1500-ft. level. Lessees working on the Silver King claim have also found good ore, but these seem to be the only encouraging strikes.

The income, exclusive of the assessment, was \$93,737; expenses \$444,723, and cash balance on hand June 30, 1910, \$544,889. The stockholders' liability is still \$1,200,000 or two dollars per share. No statements are made as to ore reserves.

Consolidated Mining and Smelting Company

The report of the Consolidated Mining and Smelting Company, of Canada for the year ended June 30, 1910, is lacking in technical information, but fairly complete from the financial standpoint.

A net profit of \$309,945 was earned, all of which was turned over to the balance on profit and loss account, which now amounts to \$671,011, or 12.08 per cent. on the issued stock, \$5,555,200. The amount written off to depreciation was \$175,503, about 10 per cent. of the value of the smelting and refining plants.

SMALL STOCKS ON HAND

There were metals to the extent of \$5,911,767 smelted, most of which were promptly sold, as the stocks of metal in storage, in transit, and in process amounted to only \$812,933 on June 30, of which almost one-half was in unsmelted ore.

ORE RESERVES

The ore reserves apparently amount to less than 400,000 tons and nothing is said as to their metal tenor. There were 487,125 tons smelted during the last fiscal year. No. 7 mine in the Boundary district and the Mollie Gibson near Nelson were acquired during the year, and a lease taken on the Sullivan mine near Kimberley. The developed ores in these mines are estimated at about 26,000 tons of a gross value of \$380,000.

To date, the Consolidated Mining and Smelting Company has paid \$781,885 in dividends, one of 1 1/4 per cent. in November, 1907, being the last.

Lackawanna Steel Company

The Lackawanna Steel Company makes the following report of its operations for the nine months ended Sept. 30:

	1909.	1910.	Changes.
Income from operations.....	\$2,126,224	\$4,021,493	I. \$1,895,269
Income from investments.....	241,381	867,000	I. 625,619
Total.....	\$2,367,605	\$4,888,493	I. \$2,520,888
Interest and sinking fund.....	\$1,439,691	\$1,585,353	I. \$ 145,662
Depreciation, etc..	831,944	1,016,804	I. 184,860
Total charges....	\$2,271,635	\$2,602,157	I. \$ 330,522
Surplus.....	\$ 95,970	\$2,286,336	I. \$2,190,366

The unfilled orders as of Sept. 30 were for 261,031 tons of material of all kinds; a decrease of 144,931 tons from last year.

The cornerstone of a three-story Y. M. C. A. building, size 65x120 ft., being erected by the Tennessee Copper Company for its employees was laid on Oct. 14, 1910. It will contain bowling alleys, pool and billiard tables and gymnasium, besides the usual class and reading rooms.

DETAILS of PRACTICAL MINING

Notes of Interest to Prospectors and Operators of Small as Well as Large Mines. Things That Have to Be Done in Everyday Mining

Starting a Ventilating Fan Automatically

BY S. A. WORCESTER*

The Conundrum gold mine at Cripple Creek, Colo., now being operated under a lease to me, is ventilated by a system of my invention, being a large fan operated by a 15 h.p., three-phase induction motor. The motor is started from one to two hours before the shift goes to work, so that no gas will remain in the mine at "tally." For the first two or three weeks this starting was done by a miner who went to the mine early for this purpose. Later I devised and put in use the arrangement shown in the accompanying sketch, which saves several dollars each month, besides being accurate and reliable.

STARTING DEVICE OPERATED BY CLOCK

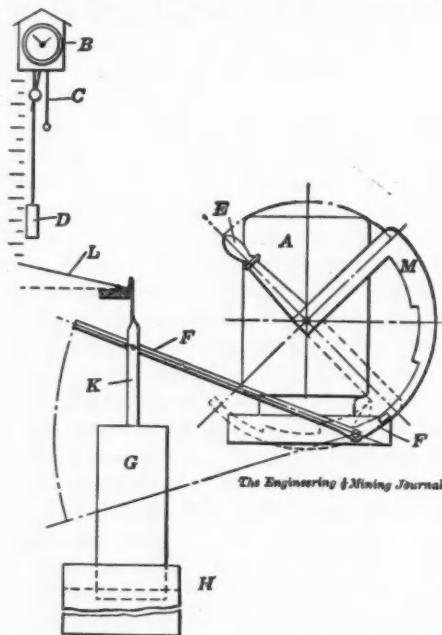
The starting box *A* is the ordinary starting compensator used with induction motors, and has three "on" positions and the "off" position. The one-day weighted clock *B* is wound by pulling down the weight chain *C*, thus raising the weight *D*. The marks on the wall indicate the travel of the weight per hour and show how far the weight should be raised to start the fan within a given length of time. When the motor is stopped, the starting lever *E* is set as shown, in the "off" position, and is held in this position by the releasing lever *F*. The releasing lever has a bucket *G* suspended near its outer end and with its bottom a little below the surface of the water in the can *H*, which is an ordinary square 5-gal. oil can, with the top cut out. The bucket is made from a piece of 6-in. galvanized air pipe with a wooden plug for a bottom; a hole about $\frac{1}{8}$ in. in diameter is bored through the bottom. The bail *K* of the bucket, is hooked and hung on the trigger *L*.

When the clock weight *D* descends and lowers the long arm of the trigger, the bucket is unhooked and drops, carrying down the releasing lever *F* far enough to allow the starting weight *M*, which is fast to the handle *E* and moves with it, to drop one notch, bringing the compensator to the first "on" position. The bucket now sinks slowly as the water enters through the small hole in its bottom, requiring 18 sec. to lower

the releasing lever so as to pass the second step of the weight *M*, and 12 sec. more to release the third, or full-speed step, 30 sec. being required to bring the fan to full speed. The water has a little oil on its surface to prevent evaporation. The operation of this arrangement is independent of manual skill and care and assures an easy and reliable start, with no danger of throwing the belt off or burning out fuses.

SATISFACTORY VENTILATION HAS MADE POSSIBLE THE OPERATION OF THE MINE

The fan draws air from the surface through a long tunnel. It is situated in a short crosscut from the tunnel to the



AUTOMATIC STARTER FOR VENTILATING FAN

hoist shaft and about 150 ft. below the underground electric-hoist station. The air current is forced directly down the main hoisting shaft. The engineer visits the fan usually once each day, to see that the oil is feeding properly, and no further attention is required, except stopping and setting the starter for the proper time.

Before this ventilation system was installed the mine, which has about three miles of workings, was often entirely filled with mine gas, from the seventh level to the adit-tunnel entrance, a vertical distance of about 800 ft. The seventh level was inaccessible in even the most favorable weather and the gas zone was more than 150 ft. deep in all

ordinary weather. One or more men had been killed in this mine by the gas which contains, by Government analysis, 10 per cent. of carbon dioxide. The mine had been practically abandoned for five years on account of the gas. The ventilation is now perfect in all parts of the mine, and completely independent of weather conditions. The fungus or mold which was at first found throughout the mine, has all dried up and disappeared, and the air is cool and pleasant; candles will burn in all parts of the workings.

A Useful Pump Formula

BY A. LIVINGSTONE OKE*

Some years ago, while in charge of the work of unwatering the mine in Portugal, I noticed the following simple relation between the tons of water delivered per hour by the pump and the diameter in inches of the pump plunger, or piston:

Tons per hour equal the plunger displacement in cubic feet per hour times the weight of a cubic foot of water divided by the number of pounds in a ton.

$$T = \frac{d^2 \times 22 \times 100 \times 60 \times 62.5}{4 \times 7 \times 144 \times 2000} = d^2 \times 1.023$$

or only 2.3 per cent. more short tons than the square of the plunger diameter in inches. For the long ton the value is $d^2 \times 0.924$, or 7.6 per cent. less than the square of the plunger diameter in inches.

These factors are based on the assumption that the piston speed is 100 ft. per min., which is that usually adopted in ordinary reciprocating steam and other pumps. In any case the formula is easily applied by multiplying the speed and dividing by 100. It will be seen then that the square of the diameter of a pump plunger expressed in inches is nearly the same as the short tons it will deliver in an hour, neglecting slip. In dealing with long tons, this amount should be reduced by one-tenth, thus an 8-in. pump will deliver $(8 \times 8) - 6.4 = 57.6$ long tons, which, in most cases, will be rather over, than under, the actual amount on account of slip in the valves. In short tons it is quite close enough to say that it is simply the square.

FORMULA APPLICABLE TO PIPE DISCHARGE

This formula is applicable to pipes when the rate of flow per minute is

*Resident manager, Argentine & General Exploration Company, Rodeo, San Juan, Argentina.

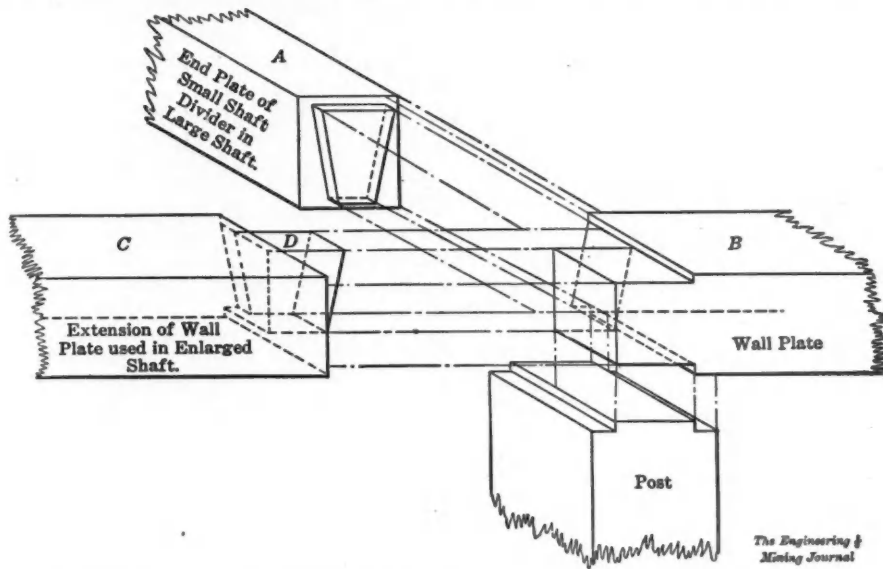
*Mechanical engineer, Victor, Colo.

known. Thus a 4-in. pipe, through which the water is flowing, at 400 ft. per min. is delivering $4 \times 4 \times 4 = 64$ tons of water per hour. In approximations where the spouting velocity and nozzle diameter are known, the values obtained will be, of course, a little high, but the formula affords a means whereby a rapid calculation gives a quantitative approximation. I have often found this formula surprisingly useful when examining mines where numerous small pumps are in use, and also in rapidly approximating the capacity of pipe lines.

Method of Extending Shaft Timbers

BY D. A. McMILLEN*

In timbering shafts it is often necessary to devise some means of converting an end plate into a divider and ex-



FRAMING FOR SHAFT TIMBERS TO ALLOW FOR ADDITIONAL COMPARTMENT

tending the wall plate so as to add another compartment. In the ordinary procedure, when adding an extra shaft compartment, it is often cheapest to re-timber entirely that portion of the shaft which is to be enlarged, as the ordinary wall plate serving for a two-compartment shaft will not do for one of three compartments.

If the end plate of the two-compartment shaft is framed in the beginning, as shown in the accompanying diagram at A and the wall plate on the side to be extended as B, it is comparatively easy to add an extension C to the wall plate and to fit these together, making the timbers B and C act as wall plates, and A as a divider instead of an end plate. The scheme thus simply resolves itself into a matter of cutting the wall plate B-C into two parts that can be afterward fitted together. A block to conform with the shape of D is usually

*Mining engineer, Globe, Ariz.

fitted into the open space that is left before the timbers of the extra compartment are added. This system has been adopted in several places in the Globe district and has proved quite satisfactory.

Top and Bottom Drilling in Pig Copper

BY DONALD M. LIDDELL*

It seems to be an established fact in the sampling of copper bars that samples taken by drilling from the top of the bars will not check with those obtained from the bottom.

There is no fixed rule in the case, that is, all samples drilled from the bottom are not richer than those drilled from the top, although the majority of pimple-copper samples seem to be, so that one

in the course of drilling several lots, whereas the richness of top over bottom or bottom over top remains fairly consistent in any given brand of copper. The accompanying table shows the differences springing from this source.

The differences appear to arise chiefly from the following causes. When the drill strikes the copper it produces fine dust for the first few revolutions. This dust is, as a rule, much richer than the average of the drill hole, and being caught by the unevenness of the surface in pimple metal is not brushed into the sample, so that the sample taken by drilling from the top will be too low in value. The bottom of the pig is smoother and does not hold the dust from its surface to as great an extent, nor does blister copper. Moreover, there is probably a certain amount of dirt brushed into the sample from the top of the pig, which lowers the value. In drilling from the bottom the drill will probably break through the last of the hole carrying away chunks from the surrounding surface. These are richer than the average of the

ASSAY OF SKIN OF COPPER PIG.

DEPTH.	Ag. Oz.	Au. Oz.
Surface to 1/4 in.	146.2	2.58
1/4 in. to 1/2 in.	129.2	2.54
1/2 in. to 3/4 in.	135.2	2.56
3/4 in. to 1 in.	134.2	2.55
1 in. to 1 1/4 in.	134.6	2.56
1 1/4 in. to 1 1/2 in.	131.5	2.52
Top Burs.	160.0	2.35
Bottom Burs.	100.1	1.44
Assay of Lot.	91.7	2.125

rest of the sample and consequently raise its value. In drilling blister copper from the top the drillings are likely to be thrown into the blister around the drill and escape getting into the sample, thereby making it poorer. This can be prevented to a great extent by smashing the

DIFFERENCES IN TOP AND BOTTOM SAMPLING.

	A	B	C	D	E	F
COPPER, PER CENT.						
Drilled from Top	99.085	98.986	99.068	98.872	98.356	99.027
Drilled from Bottom	98.977	99.058	98.896	98.805	98.290	99.095
SILVER OZ.						
Drilled from Top	36.70	50.49	71.40	96.02	240.01	35.55
Drilled from Bottom	37.54	50.40	73.72	95.815	238.85	34.05
GOLD OZ.						
Drilled from Top	13.468	.874	.496	15.953	7.677	1.296
Drilled from Bottom	13.539	.875	.514	15.883	7.632	1.281

Each of the above represents an average of five to twenty lots. A, B and C, pimple finish. D, E and F, blister finish.

might be led into thinking that the difference was simply due to a different order of drill holes with regard to the pigs, i.e., that if the pigs were numbered 1, 2, 3, etc., and the templet holes correspond to this order on the first drilling, that in drilling again, hole No. 3 might fall in pig No. 1, etc., producing a small assay variation. However, if this were the case, the matter would probably even itself up

*Editorial staff, ENG. AND MIN. JOURN.

blisters down with a heavy hammer before beginning the drilling.

Concerning the rich "skin" of a copper pig, the accompanying table of assays may be of interest, the samples being taken by removing one layer after another of a pig.

The last three results were obtained by picking out all burs obtained from the top and all burs from the bottom of a complete lot.

It seems needless further to multiply

examples, the general conclusion being that in copper bars there exists a thin skin on both the top and bottom of the pig, which is very much richer than the inside, and that any sampling which does not allow for this fact will be more or less incorrect. It seems as far as my experiments go, that in pimple-copper, samples obtained by drilling from the top will be richer than those obtained by drilling from the bottom, while the reverse seems true in blister. From furnace runs on weighed material it also seems to be established that neither sample is correct, but that the average results obtained by drilling one-half from the top and one-half from the bottom will be close to the truth. With anodes (furnace-refined copper) there seems to be little difference between samples obtained

Mine Eductors

BY OSKAR NAGEL*

The lifting of large quantities of water, a problem of great importance in mining, is mostly performed by means of pumps. In places, however, where the space available is insufficient for the installation of a pump, the water-jet eductor, Fig. 1, is the proper machine to use. The pressure water enters the eductor at *P*. Passing through a nozzle, it creates a vacuum, and raises the water by suction at *S*, discharging the entire volume of liquid at *D*. These eductors are designed to raise water by means of high-pressure water, and are used as follows:

(1). Water collecting at a consider-

of eductors. Even with a low fall the eductor retains its capacity for high suction up to 16 ft. and above.

The advantages of eductors for sinking shafts have caused their application in connection with high-pressure pumps. Fig. 4 shows such a plant. *D* is the discharge, *E* the eductor, *P* the pressure line from pump creating water pressure. This method has the following advantageous features: It is easy to handle the apparatus, as only small diameter of piping and small weights are to be taken into consideration; the small space required, and, above all, the free working space; positive working, due to the absence of moving parts; the apparatus works with equal sureness in case the water does not flow sufficiently to the shaft.

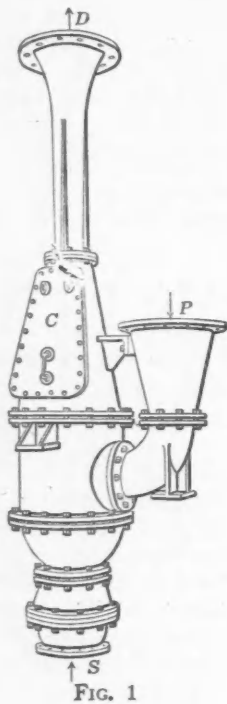


FIG. 1

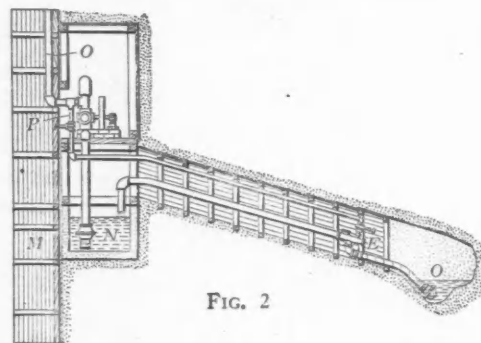


FIG. 2

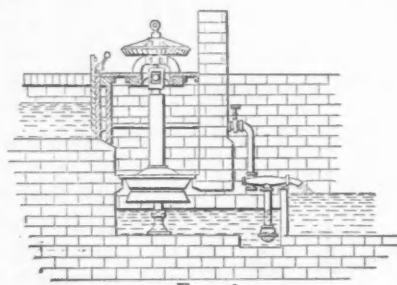


FIG. 3

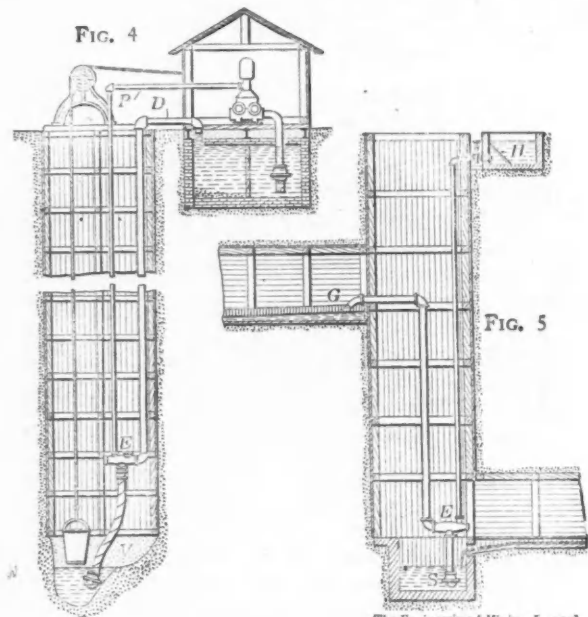


FIG. 5

The Engineering & Mining Journal

TYPES OF MINE EDUCTORS

by top and by bottom drilling, yet even here it is probably best to drill half from the top and half from the bottom.

Supporting Trolley Wires

In the new equipment at the Schley mine, Gilbert, Minn., all the trolley wires in the main haulage ways are supported by 2x10-in. planks, fastened to the caps and to these the wire supports are fastened. After the wire is in place, 2x8-in. planks are nailed to the 2x10, forming an inverted trough. This trough serves four purposes: A rigid support for the wire; protects the wire from falling rock; makes it almost impossible for a laborer to come in contact with the wire; and gives a good place for the trolley pole to run, which will prevent breakages.

able altitude is used to raise water which has collected further down, both being discharged at a medium level, thus permitting flow off through horizontal cuttings down a hillside, or to a pumping engine.

(2). In a similar manner the water from a condenser of an underground pumping engine may be raised with advantage.

(3). Even if the pressure should have an available head of but a few yards, it is possible to effect a considerable suction which is particularly useful in tunneling.

Fig. 2 shows an installation and illustrates the simple manner in which an eductor may be installed in the smallest possible space. *E* is the eductor, *O* the suction hose, *P* the main pump. Fig. 3 shows how in a turbine installation the fall of a river may be utilized by means

*Consulting chemical engineer, P. O. Box 380, New York.

Fig. 5 shows the eductor in a shaft taking the head-water from the surface and discharging into an upper gangway. From the flume *H* on the surface, the water flows to the eductor *E* and lifts the water from sump *S*, discharging into the gangway, or passage *G*.

These mine eductors are used by: Thomas Shelton (Engelbach Machinery Company), Leadville, Colo.; Compañía de Santa Gertrudis, S. A., Pachuca, Hidalgo, Mexico; Beneto Juarez Mines Company, Salivas, Mexico; Arizona-Parral Mining Company, Denver, Colorado.

Magnesite is now being mined at Grenville, in Argenteuil county, Quebec. The deposit is said to be large and of good quality; but production is limited by lack of transportation. The mine is 13 miles from the railroad and the road is very bad.

Vacuum Filter for Zinc Box Slimes

BY LYON SMITH*

A vacuum filter for use in small leaching plants, where it is not expedient to install a filter press, is shown in accompanying drawing. The filter box is constructed of two-inch boards, preferably redwood or fir, which are held tightly together by drawbolts. The inside wooden frame is for the support of the iron screen over which is placed an 8-oz. canvas filter cloth. The canvas is cut about 5 in. larger than the screen and is held in place by rope calking around the

Carbon Dioxide Criterion for Ventilation

Recognizing the serious consequence of insufficient ventilation to workers in the Transvaal mines, the Mining Regulations Commission has made a number of excellent recommendations for the bettering of underground conditions. The legal maximum for noxious carbon-dioxide, is fixed at eight parts by volume in 10,000 of air; in addition four parts representing innocuous CO₂ present in the atmosphere, three parts where candles or similar illuminations are used, and five parts in order to meet the difficulties of practical administration in regard to possible innocuous gas from country rock and

taken at considerable depth. The maximum permissible amount of carbon monoxide, CO, in any part of a mine is not to exceed 0.01 per cent. and no practically determinable amount of NO₂ shall be permitted in any part of the mine.

QUALITY NOT QUANTITY OF AIR SUPPLY IS VITAL

The commission seems to recognize that the application of the existing Transvaal laws on the subject of mine ventilation is open to serious practical difficulties. The quantity standard (70 cu.ft. of air per man per min.) is judged as less satisfactory than one of quality. The quantity of carbon dioxide present is accepted as bearing a roughly constant proportion to the amount of impurity present and the carbon dioxide is considered the best criterion of the sufficiency of ventilation.

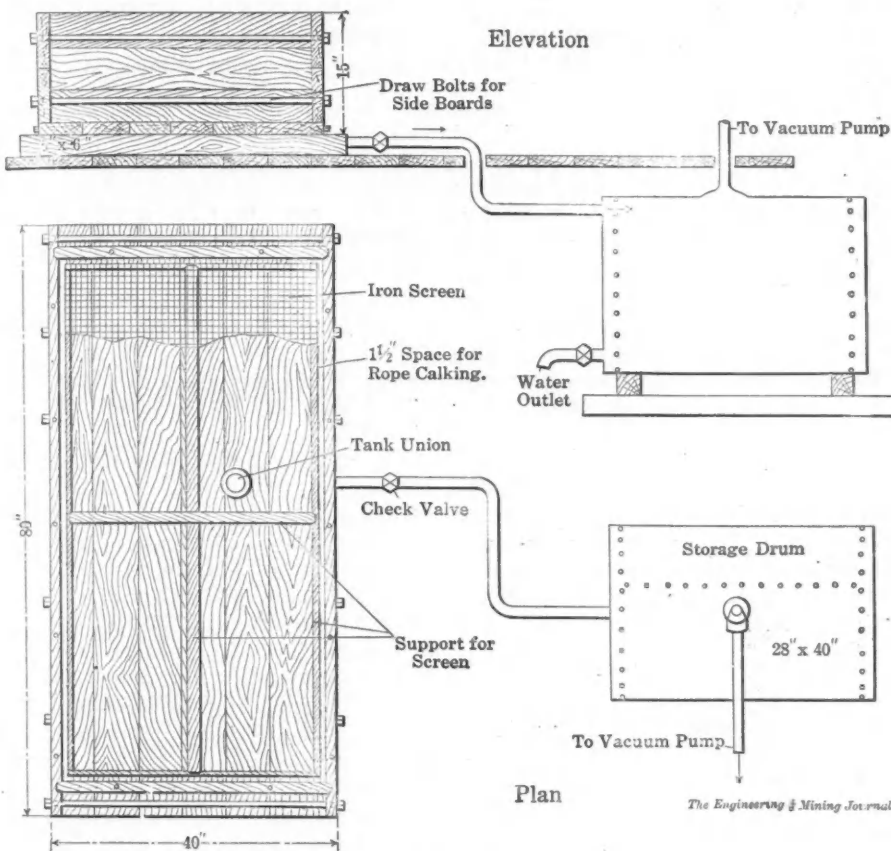
Drill Sharpening Underground

As the sharpening of drills underground is becoming the common practice in a number of our large mines, it is interesting to hear the report of the committee of the Mining Regulations Commission of Transvaal that investigated this subject. The Blacksmiths' and Drill-sharpeners' Association of the Transvaal placed before the commission a communication setting forth their objections to the sharpening of drills being carried on underground.

Investigations were made with reference to the matter, and as a result the commission gives its opinion that in no case ought the sharpening of drills to be permitted underground, where, in the opinion of the inspector of mines, such work would be unhealthy. It is, however, recognized that, although the increase in cost from having this class of work done on the surface is not great, when the conditions underground are healthy, there can be no valid reason why such work should not be done underground. In other words, the sharpening of drills underground does not necessarily create unhealthy conditions, and the determining point is the actual resulting underground conditions when sharpening is being done there.

Wages in San Juan Mines, Colorado

A prominent mining company in the San Juan district of Colorado reports the following scale of mine wages: Shift bosses \$5; diamond-drill men, \$6; pipe-fitters, carpenters and blacksmiths, \$4.50; machine-drill men, timberers, engineers, pumpmen, and drill sharpeners, \$4; blacksmiths' helpers and teamsters, \$3.25; miners, trammers, muckers, timbermen's helpers, diamond-drill helpers, and surface laborers, \$3. All except teamsters, carpenters and surface laborers have an eight-hour day, these three classes working nine hours.



VACUUM FILTER FOR ZINC-BOX SLIMES

edges. An ordinary distillate or gasoline drum makes an excellent storage tank.

OPERATION OF FILTER

The slimes from the cleanup vat are delivered to the filter and the clear water passes to the storage drum, from which it is drawn off to waste, or, if desired, it may be conducted back into the system. The slimes are reduced to about 30 to 33 per cent. moisture and are then removed to the drier. A cleanup from a 4-ton settling tank, from which about three tons of clear solution is first pumped off, can be made in from four to five hours.

other uncertain sources, are allowed. The total limit is, therefore, 20 parts of CO₂ per 10,000 of air. In the Lydenburg district, where there is geologically strong presumptive evidence of a production of ground CO₂, further investigation is recommended and an allowance of 1 per cent. maximum by volume CO₂ in the mine air is made.

LIMITS FOR CARBON MONOXIDE AND NITROGEN DIOXIDE

It is stipulated in the recommendations that samples for testing purposes be taken not less than one hour after blasting. No allowance is to be made for the altitude of the land, as affecting the allowable CO₂ limit, as many samples will be

*Mining engineer, Cortez, Mexico.

German Miners' Insurance and Annuity Funds—II

Average Invalidity Pension, \$75. Average Duration of Pension, about Eight Years. The Average Death Rate, 58 per Thousand

BY FREDERICK L. HOFFMAN*

The General Mine Workers' Union, of Bochum, Germany, has a general pension fund, which includes 83 per cent. of the entire membership, which, in 1909, numbered 289,060, including 9384 officials. All the workmen and officials who, according to the law are members of the Sick Fund, that is, exclusive of those who are voluntarily members thereof, are members of the pension fund, provided they have attained to 16 years of age and are not over 40. A medical examination is required. A waiting period of five years is necessary before a member is entitled to benefits. The members are divided into active members, and mine invalids, which constitute the members dependent upon the benefits of the fund. Invalids are all such as are no longer qualified for physical labor, but the term cannot be exactly defined.

The amount of the pension depends upon the length of mine employment, including however, the period during which members have been dependent upon the sick fund as well as the time of compulsory military service. The claim to a pension commences with the day of the physical disability or labor incapacity. The pension includes free medical treatment, medicine, and institutional treatment in convalescent homes. The nature of the pension is either a definite payment to the pensionable employee or, in the event of his death, to his widow, children or other immediate dependent. In the event of death an amount sufficient for decent burial expenses is paid.

EMPLOYERS AND EMPLOYEES CONTRIBUTE EQUAL AMOUNTS

The contributions to the pension fund are the same from both employers and employees. In 1909, 289,060 members of the fund paid 14,806,164 marks (\$3,523,867), which, including the corresponding amount paid by the mine owners or employers, gives a total of 29,612,329 marks (\$7,047,734). Of this sum 2,256,331 marks (\$537,007) was on account of mine officials, half of which, however, was paid by the mine owners or employers. Of every 100 marks (\$23.80) paid in contributions, 92.38 marks (\$22) was paid by the workmen, or by the employers on their account.

In 1909 there were 32,012 invalidity pensioners, of which 5656 were such on account of accidents, and 26,356 on ac-

count of sickness. Of the 32,012 pensioners, 1416, or 4.42 per cent. were mine officials. Of every 100 active members there were in 1909, 11.1 pensioners, of which 2.0 were pensioners on account of accidents and 9.1 on account of sickness. On account of the much higher age of mine officials and their lesser degree of occupation exposure, the proportionate amount of accident invalidity was only 0.6 per 100, against 2.0 for the workmen, while the sickness invalidity rate was 14.5 per 100 for mine officials against 8.9 for mine workmen.

NUMBER OF PENSIONS FOR SICKNESS FAR EXCEEDS THOSE FOR ACCIDENTS

The 32,012 invalidity pensioners in 1909 had a legal claim to 10,089,556 marks (\$2,401,314) of pension payments. Of this sum 1,110,221 marks (\$264,233) was payable on account of accident invalidity and 8,979,335 marks (\$2,137,082) on account of sickness invalidity. Because of the intimate relations between the Employers' Mutual Accident Insurance Association, established in accordance with the compulsory insurance laws, the pension fund is reimbursed to the extent that accident pensions are payable to the fund. The refund is not exactly the equivalent of the total outgo on this account, but the difference is not apparently of material importance.

ACCIDENT BENEFIT AVERAGES LESS THAN SICKNESS BENEFIT

The average invalidity pension paid in 1909 was 315.18 marks (\$75). The average pension paid on account of accident invalidity, however, was only 196.29 marks (\$46.72), against 340.69 marks (\$81.08) paid on account of every sickness-invalidity pension. The average pension paid on account of either accident or sickness invalidity to mine officials was 630.96 marks (\$150.17), while the average invalidity pension paid to mine workmen was 300.57 marks (\$71.53). The amounts paid have gradually increased on account of more liberal legal requirements. In 1909, of every 100 marks (\$23.80) paid out on account of accident pensions, 85.81 marks (\$20.42) was paid by the Mine Owners' Mutual Accident Insurance Association, and 14.19 marks (\$3.38) by the Employers and Employees' Mutual Pension Fund.

The number of new invalids during the year was 4167, or at the rate of 14.42 per 1000. The annual increment on account of accident invalidity pensions was 3.04

per 1000, and on account of sickness invalidity pensions 11.38 per 1000. The increment on account of new pensions granted to mine officials was 18.01 per 1000, and on account of mine workmen 14.29. The higher rate of increment in the case of mine officials is chiefly on account of sickness invalidity, due largely to the higher average age and, of course, to the fact that most of the officials have more than completed the waiting period of five years.

AVERAGE AGE OF NEW PENSIONERS 43.5 YEARS

The average age at which pensions were granted in 1909 was 43.5 years, or 52 years for mine officials and 43.1 years for mine workmen. In the case of mine officials the average pensionable age on account of accident pensions was 41.1 years, and on account of sickness pensions 52.8 years. The corresponding averages for mine workmen were 33.7 years for accident invalidity pensions, and 45.8 years for sickness invalidity pensions.

The average duration of employment previous to pensioning was 29.5 years for mine officials, and 19.3 years for mine workmen. In the case of mine officials the duration of previous employment was 18.5 years in the case of accident-invalidity pension, and 30.4 in the case of sickness-invalidity pension. The corresponding averages for mine workmen were 10.1 years for accident-invalidity pension, and 21.8 years for sickness-invalidity pension.

The average amount of the new pensions granted during 1909 was 1142 marks (\$271.80) on account of mine officials, and 338 marks (\$80.44) on account of mine workmen. The average amount paid on account of new accident pensions in the case of mine workmen was 154.51 marks (\$36.77), and on account of sickness-invalidity pensions 389.34 marks (\$92.66). The experience during 1909 confirms the observed upward tendency in the amount of pensions granted.

The number of pensions during 1909 was diminished by 2869, of which 1901 were terminated by death and 968 by recovery of health and wage-earning capacity. The average death rate among the total number of pensioners was, therefore, 5.80 per 100, while the average recovery rate was 2.95, and the total pension termination rate 8.75. For mine workmen alone the death rate was 5.69 per 100, but the death rate among the sickness pensioners was 6.44, and among the accident

*Statistician, Prudential Life Insurance Company, Newark, N. J.

pensioners 2.40. Among the same class the average invalidity recovery rate was 3.05 per 100, but the recovery rate among the sickness pensioners was 1.69 and among the accident pensioners 9.06.

AVERAGE AGE AT DEATH OF PENSIONER ABOUT 60 YEARS

The average age at death was 66.5 years for pensioned mine officials, and 58.3 years for mine workmen. The average age at recovery was 37.7 for mine officials and 37 years for mine workmen. Among the mine workmen only, considered separately, the average age at death among sickness pensioners was 59.1 years and among accident pensioners 48.8 years. The average age at recovery among sickness pensioners was 38.8 years, and among accident pensioners 35.5 years. These averages are quite trustworthy and they have been maintained for a number of years. They

are of a decidedly practical value in considerations regarding the probable cost of a similar accident and invalidity pension scheme for the American mining population.

AVERAGE DURATION OF PENSIONS ABOUT EIGHT YEARS

The average duration of a pension for all invalidity pensioners during 1909 was 7.9 years. The average for the sickness pensioners was 9.1 years, and for the accident pensioners 4.2 years. The average duration of pensions terminated by death was 10.7 years for sickness pensioners and 9.4 years for accident pensioners. The corresponding averages for pensions terminated by recovery were 2.7 years for sickness pensioners and 2.8 years for accident pensioners. The averages vary more or less for mine officials and workmen, but the differences are not of practical significance for the

present purpose. It may be stated, however, that among mine workmen the average duration of all pensions was 7.8 years, but for terminated sickness pensions the duration was 8.9 years against 4.2 years for the terminated accident pensions. Sickness pensions, however, terminated by death were of a duration of 10.6 years, while accident pensions terminated by death were of a duration of 9.3 years. Sickness pensions terminated by recovery were of a duration of 2.7 years and accident pensions terminated by recovery were of a duration of 2.9 years. The most significant figure is the long average duration, or after-lifetime, of mine workers seriously injured and incapacitated for work, which was 9.3 years in the case of accident pensions, a duration in marked contrast to the 3-year period which underlies modern workmen's compensation law.

(To be continued)

La Rose Consolidated Mines Company

The third annual report of the La Rose Consolidated Mines Company contains the reports of the treasurer and general manager of the operating companies as well as of the president and treasurer of the holding company, for the fiscal year ended May 31, 1910. Under date of Oct. 1, D. Lorne McGibbon, president, summarizes the company's operations for the year at Cobalt. The net value of the production for the period under review was (3,170,028 oz.) \$1,472,005; the cost of producing silver was 23.27c. per oz. and the average selling price 52.261c. per oz. During the year the company paid out of net earnings, dividends to the amount of \$900,000, equivalent to 12 per cent. on the company's capital stock, and a combined surplus of \$473,740 was accumulated by the holding and operating companies. The company employs more men than any other interest in Cobalt.

The president advises the stockholders that since May 31, ore reserves (5,544,449 oz. at that date) have been maintained and the available cash assets have been increased almost \$200,000. Several discoveries have been made, notably the one in the Princess mine which is quite important. To date the vein has been drifted on 95 ft. at the 135-ft. level showing 3 in. of 4000-oz. ore. Development work is proceeding on a large scale, special attention being given to the La Rose Extension and the Fisher-Eplett property.

TREASURER'S REPORT

The report of T. B. Pfeiffer, treasurer of the holding company, shows that the income from dividends on 5,999,930 shares, and 70 directors' shares, in the

operating company, La Rose Mines, Ltd., totaled \$909,993 and adding the surplus as of June 1, 1909, brings the total income to \$931,699. The expenses for the year totaled \$927,918, of which \$898,924 were paid as dividends on outstanding stock of the La Rose Consolidated Mines Company; administration expenses amounted to \$28,994. On May 31, a surplus of \$3781 showed on the balance sheet.

The assets of the company as of May 31, 1910, were: the entire stock of the La Rose Mines, Ltd., the Lawson Mine Ltd. and the Violet Mining Company, valued at \$7,474,990; 7262 shares of the University Mines, Ltd., \$18,145; accounts receivable, \$3022; furniture and fixtures, \$413; cash on hand, \$345; total, \$7,496,916. The liabilities were capital stock and the surplus.

GENERAL MANAGER'S REPORT

R. B. Watson, general manager of the operating company, gives a full resumé of the operations at the mine during the year under review. Shipments are stated to have been 6313.905 dry tons (average value per ton, \$228.38) containing 3,100,443 oz. silver of a net value of \$1,441,974. Of the total net value 75.12 per cent. was realized from silver-cobalt-nickel ore, 13.05 per cent. from low-grade silicious ore and 11.83 per cent. from concentrates. The average assay of the silver-cobalt-nickel ore was 1181.98 oz. silver per ton, 8.71 per cent. cobalt and 7.99 per cent. nickel; of the low-grade silicious ore, 133.84 oz. silver; concentrates, 649.79 oz. silver, 7.10 per cent. cobalt and 6.36 per cent. nickel. The gross sil-

ver value plus cobalt paid for was \$1,650,039; smelter deduction, freight and treatment amounted to \$208,065.

COST OF PRODUCING SILVER

The segregated costs of producing silver are as follows: Mine operations, 14.14c. per oz. of silver; concentration, 1.93c.; depreciation, 0.3c.; marketing ore, 6.84c.; corporation and traveling expense, 0.07c.; total, 23.28c. Adding the cost of operation of the University mine and deducting for rents collected, the total cost of production per ounce of silver figures as 23.27c.; the total cost of production, as 43.90 per cent. of the gross value of ore produced.

Total shipments of the La Rose Mines, Ltd., to May 31, 1910 netted \$4,267,379 from the smelters. The company paid previous to May 31, 1908, \$1,204,862 in profits to owners and from that date to May 31, 1910, \$1,570,000 in dividends, making the total profit realized \$2,774,862.

DEVELOPMENT WORK

A summary of the work done during the year on the various properties shows the following: Trenching, 5.16 miles; sinking 342 ft.; drifting, 5731 ft.; cross-cutting, 3046 ft.; raising, 940 ft.; stoping, 18,789 cu.yd. Of the total ground stoped, 14,436 cu.yd., were broken in the La Rose mine. The year's output was divided between the several mines as follows: La Rose, 5817.4 dry tons containing 2,875,713 oz. of silver; Lawson, 264.9 tons, 173,730 oz.; Princess, 234.1 tons, 113,146 oz.; University, 16.9 tons, 7439 ounces.

The Northern Customs Concentrator, Ltd., after enlarging its mill, started in September, 1909, to treat the La Rose low-grade ores and is now handling 100 tons per day. The profit on the mill rock for the period amounted to \$138,218.

EXPLOITATION OF PROPERTIES

The manager states that the No. 3, McDonald No. 10 and No. 4 veins are, in order of importance, the producing veins on the parent claim. Workings on all these veins are connected, the ore being hoisted through the central shaft. The crosscut on the main vein has been proved for a length of 850 ft. and is opened by two levels at 62 ft. and 157 ft. in depth. The shaft on No. 3 vein was sunk to 135-ft. level through the conglomerate into the Keewatin formation and it was found that the vein persisted and continued to be of exceptionally high grade. This is unusual for the Cobalt camp.

The La Rose Extension claim will be

ORE RESERVES

The manager asserts that most of the ore reserves shown in the report are fully developed, but that there will always be uncertainty in the estimation of reserves in such rich, irregular veins. The developed and partly developed ore in the various properties, as of May 31, 1910, was: La Rose, 62,122 tons, 4,471,426 oz.; Princess, 3332 tons, 342,841 oz.; Lawson, 395 tons, 730,182 oz.; total, 65,849 tons containing 5,544,449 oz. of silver. Of the total 2876 tons containing 3,088,751 oz. of silver are considered as high-grade rock and 62,973 tons containing 1,655,698 oz. as mill rock.

Compania Minera de Penoles

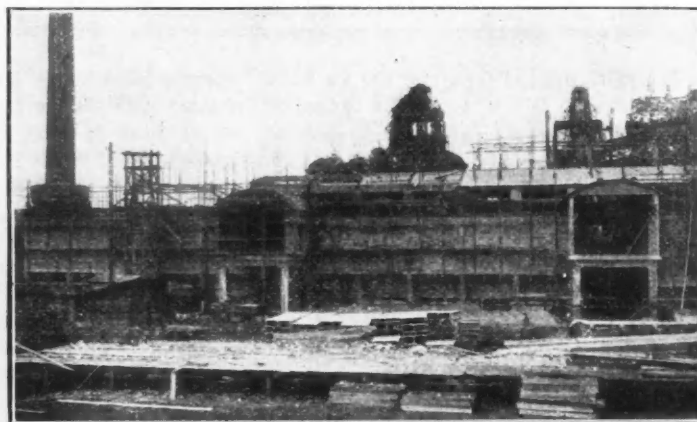
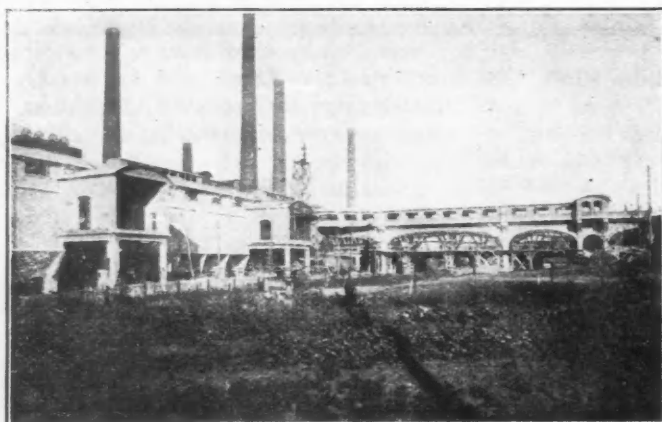
The report for the Peñoles company for the year ended Dec. 31, 1909, shows a profit of 597,141 pesos, and total undivided profits of 612,415 pesos, an amount decidedly in excess of the entire capitalization of the company at that time.

Heberlein roasting furnaces, and 12 pots, 8 ft. 4 in. diameter. The roasting plant has a capacity of 120 tons per day. There are six blast furnaces of 150-ton capacity each, 46x162 in. at the tuyeres. All matte and clay are taken to matte-separating furnaces, two reverberatories with 9½x19 ft. hearths, each holding 60 to 80 tons of slag and matte. There is an arsenic plant with a maximum capacity of 1500 tons of white arsenic per annum, but the actual output is dependent on the ores melted. No technical operating details are given.

The Zueblin System of Ore Chutes

BY ALFRED GRADENWITZ*

The drawing of ore and granular material from storage bins is frequently subjected to annoying delays by the blocking of the material in the relatively narrow neck usually provided for the discharge of the material. A number of



REINFORCED-CONCRETE ORE BUNKERS AND TRANSPORTING BRIDGE OF THE GELSENKIRCHEN COMPANY AT ESCH, LUXEMBURG

prospected underground as fast as possible. The Lawson mine is stated to be well equipped and the claim is being rapidly explored; over 2800 ft. of underground work was done during the year. Work on the Lawson is to be pushed although showings have been somewhat disappointing. The University will be prospected at a later date. A special report values this property at \$1,000,000 and shows the net deficit on operations to date to be \$12,972. The Fisher-Eplett claims are now being trenched and a crosscut driven into the Fisher claim from the 300-ft. level of the Shamrock mine. The formation of the Princess is conglomerate. Only half the area has been explored and it is proving, the manager thinks, to be one of the best pieces of ground owned by the company. The first level at this mine is at 50 ft. but most of the work has been done on the 135-ft. level. The orebody of No. 1 vein is 120 ft. long on both levels and consists of good mill rock.

The directors' report states that as no construction work was being carried on, none contemplated beyond equipping one shaft, and as all installations were up-to-date, and ample in size, a much larger proportion of the gross earnings will be distributed to the stockholders in the future.

This promise has been well kept, as 300 per cent. on the old capitalization has been distributed since the beginning of 1910. The company has now been reorganized, the capitalization having been increased from 250,000 to 4,000,000 pesos.

There are no statements as to ore reserves except that a new orebody is stated to show 20,000 tons of first-class ore. Diamond drilling, amounting to 73,635 m. was done at a cost of \$0.54 per m., and 16,449 m. of development work at \$13.33 per m. Mining costs were: General expense and power, \$2,475; exploration and dead work, \$1,455; extraction of ore, \$1.26; cleaning ore, \$0.095; freight to smeltery, \$0.295; total, \$5.58.

There are four revolving Huntington-

devices have been designed for closing the discharge openings of ore bunkers, but owing to the narrowness of the openings, barring must nearly always be resorted to. The frequent interruption in loading railway trucks of 12 to 40 tons obviously involves a large waste of time.

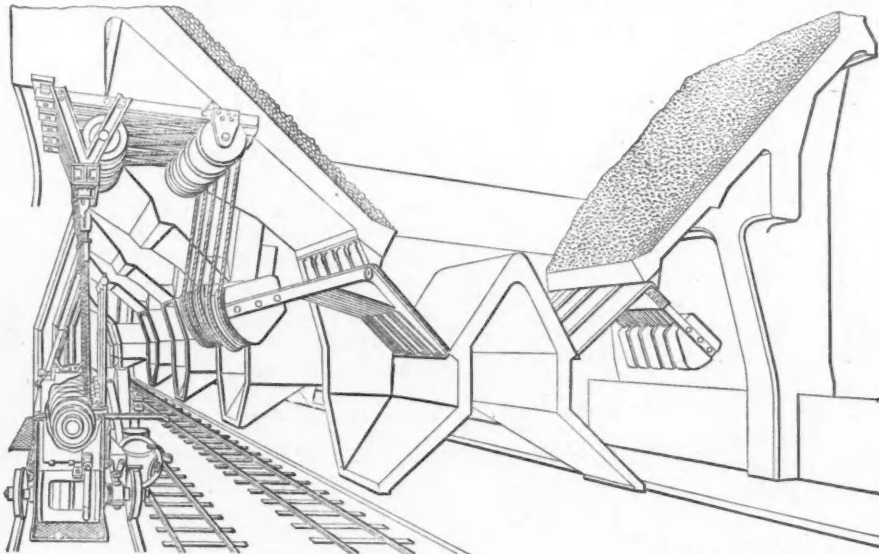
In the Minette iron district of France, a number of devices have been tried, some of which have been successful, particularly where only small quantities of ore were handled. To facilitate the loading of large quantities of material, a design similar to the finger chute sometimes used underground, has been patented by E. G. Zueblin & Co., of Strasburg. As shown in the accompanying illustration, this gate consists of a large number of self-contained valves or fingers, loaded with heavy counterweights. The ore is discharged from the bin by lifting the fingers by the aid of a winch, which may be either stationary or portable, and has an operating lever for each finger. The

*3 Regensburgerstrasse, Berlin, W., Germany.

size of the hopper is designed with reference to the size of the largest piece of ore to be handled. The Züblin gate affords the additional advantage that minimum amounts of ore can be dropped by lifting a single valve or finger, an advantage which will be appreciated in connection with blast-furnace charging plants where cars are weighed and balanced under the bin. In a test made in loading 15- to 20-ton cars, the time required for loading was 10 to 15 sec. per car.

INSTALLATION OF ZUEBLIN GATES

These gates have been installed by the Gelsenkirchen Mining Company, at Esch, Luxemburg. The ore bunkers at this plant are made of reinforced concrete throughout, and the discharge holes are provided with 32 of these gates, controlled by traveling winches. These concrete ore bunkers are shown in the accompanying halftone engravings.



ZUEBLIN ORE GATE AND HOPPER

Another equipment of Züblin gates is being installed for the Société Civile des Mines de St. Pierremont, at Mancieulles, France. This comprises three double gates of 12 valves each, which will be exclusively used for loading railway cars. The individual gates may be used for filling a 10-ton car, while the double gate loads, without shifting, the 40-ton cars, which are weighed at the bin.

Attorney-General O'Malley, of New York has advised the State comptroller that the shares of stock of the Cumberland-Ely Copper Company, which were delivered to the Nevada Consolidated Copper Company at its Boston office in exchange for stock in that company, and subsequently delivered at its New York office for transfer on the books in New York, were subject to the stock-transfer tax. He holds that the actual consummation of the transaction took place in New York State.

Magnesite Mining in California

SAN FRANCISCO CORRESPONDENCE

The magnesite deposits on Red mountain, California, at the junction of Alameda, Stanislaus and Santa Clara counties, formerly worked by the Western Magnesite Company, have been leased for 50 years by a new organization called the Fuller Red Mountain Magnesite Company, of San Francisco. The deal includes the mines, reduction or calcining plant, traction engines, contracts, etc. New tanks for oil fuel for the calcining furnaces have been ordered, as well as new traction engines for hauling the raw and calcined mineral from the mines to the railroad at Livermore. The directors of the new company are the Fuller brothers, W. Wiley and N. Marcuse, of San Francisco. F. Reanier is local manager. The Western Magnesite Company is not to retire

Cutter, on the Jornada del Meurto, about half way between El Paso and Albuquerque on the main line of the Santa Fé railway, at the junction of the branch line to Elephant Butte. Here water can be obtained at 90 to 110 ft. A power plant is nearly completed, which will supply electric power for the mill and mine.

The Vanadium Queen Mining Company of Las Animas district is completing its plans for a large concentrating plant on the Rio Perche, and it is presumed that actual work will begin soon. The holdings of this company promise a large production of vanadium.

Oriental Mining Company

The report of this company operating mines in Korea is exceptionally complete as regards information on ore hoisted and treated, status of ore reserves, and working costs and profits for the fiscal year ended June 30, 1910.

The dividends paid amounted to 11.5 per cent. on outstanding stock, besides which \$90,886 was added to the undistributed profits on hand, which now amount to 12.5 per cent. on the stock issued. Additions to the ore reserves amounted to \$700,000, and prospecting in four of the seven company mines gave encouraging results.

TOTAL COSTS AVERAGED \$2.53 PER TON

The company mined 319,885 tons of ore, on which the mining costs varied from \$0.775 on 29,180 tons from the Kuk San Dong South mine to \$6.30 on 1056 tons from the East Candlestick. The average was \$1.415.

The average milling cost was \$0.545, varying from \$0.46 at the Kuk San Dong to \$1.695 at the Candlestick Mill. General expenses were \$0.335; concentrates expenses \$0.13 per ton of ore mined; transportation, \$0.015; development \$0.055; construction \$0.04, a total of \$2.53, while the total earnings were \$4.48 per ton of ore.

The general average of the ore was \$5.43 per ton, of which \$2.76 was recovered as free-milling gold, and \$2.005 in concentrates, but of the latter only \$1.64 was ultimately recovered.

DETAILED COSTS

It is interesting to note that the cyanide plant treated 29,291 tons at a cost of \$1.36, of which \$0.591 was for cyanide, and \$0.086 for zinc, and a total cost of supplies of \$0.885. Labor amounted to \$0.265, the other 15c. being for power, shops, etc.

Of a total mining cost of \$1.415, \$0.209 was for mine timbers; \$0.176 for cord wood; and \$0.107 for lumber; included in a total of \$0.768 for supplies. Labor and salaries come to \$0.613 per ton.

The total value of ore produced to date by this company is \$14,166,729.

from the field, but will work other deposits in the same locality and sell the calcined material.

Vanadium in New Mexico

SPECIAL CORRESPONDENCE

The Vanadium Mines Company, operating in the Caballos district, Sierra county, N. Mex., is developing the White Swan mine and has sunk a two-compartment shaft to 140 ft., with a 150-ft. drift at the 80-ft. level. A body of vanadium-bearing ore has been uncovered which is said to assay 2 per cent. V_2O_5 . The company is planning a reduction plant in addition to its present 50-ton concentrating mill. This plant will consist of one calcining furnace, 10 leaching and two evaporating tanks capable of producing daily 2000 lb. of V_2O_5 . The cost will be about \$100,000 and the plant will be at

Occurrence of Tungsten in Rand District, Cal.

Occurs Commercially as Scheelite. Plate Amalgamation of Tungstengold Ores Difficult. Much Valuable Ore Lost through Ignorance

BY SAMUEL H. DOLBEAR*

Except at Atolia, in the southeasterly portion of the Rand mining district, of California, where tungsten is being mined as an industry in itself, the occurrence of tungsten as scheelite in the ores of the Rand mining district has not been considered of commercial importance until recently. The distribution of tungsten in this district does not seem to be limited to any definite area, its existence having been noted in all parts of the district, associated with the gold ores, or independently. Scheelite (CaWO_3) is the only ore of tungsten which has been found here in economic quantities although seams of wolframite have been recently reported.

It has been noted by writers on the subject, that where the tungsten ores are rich, gold values are poor. This is not necessarily the case in the Rand mining district, for in several of the mines, notably the Gold Coin, Baltic, Wickard, and Sydney group, ore of sufficient tungsten content to be considered valuable, has been found to carry as high as \$50 to \$60 per ton in gold.

EARLY TUNGSTEN OPERATIONS

The chief operations for tungsten in the district are being conducted at Atolia, by the Atolia Mining Company. The presence of tungsten at this point first became known as early as 1904. The discovery was made and development operations carried on by W. A. Wickard, Thomas McCarty and Charles Churchill. The vein was on the Papoose claim, the original discovery was about three ft. in width, and was found in weathered granite. While the vein in the lateral workings from the main shaft on the Papoose is said to be continuous, the tungsten is unevenly distributed, occurring in lenses. In the barren parts, the vein is quartz, which is the main impurity in most of the tungsten ores.

FIRST SHIPMENTS TO GERMANY

Working to a depth of between 150 and 200 ft. it is said that the ore at the Papoose mine was exhausted. Operations are now largely confined to the Churchill and Weatherbee veins, the latter recently acquired by the Atolia company.

During early operations hand picking of ore was employed, the better grade of material being determined by its weight. The principal demand for tungsten ores in 1905 was in the German manufacturing industries, and the first several cars

*Mining engineer, Johannesburg, Cal.

of picked ore were exported to that market. At present the ores are crushed with a Blake crusher, ground in a six-foot Huntington mill, and concentrated with Frue vanners. The recovery effected by this treatment is from 72 to 82 per cent. About 30 men are now employed in the mine and mill. The ore being treated is said to run from 6 to 8 per cent. tungstic acid, the concentrated material from 67 to 68 per cent. tungstic acid. The monthly production amounts to \$10,000, approximately.

GEOLOGICAL FEATURES

At the northern end of the tungsten belt we find intrusive granites several miles in length, cutting the schists. Tungsten has been found north of this intrusion but sparingly, in the schists; the principal tungsten orebodies being found in an older granite mass in the southern part of the belt.

Over a large area in what is locally called the Stringer district, are found irregular fissures in the granites and schists which in many places contain gold ore, and sometimes tungsten. The veins may be valuable for both minerals, or may contain but one. This condition is noted on and near the Baltic mine, where both gold-tungsten, gold, and tungsten ores have been mined in various places. The first shipment of tungsten from the district was made from the Baltic mine.

GOLD-TUNGSTEN ORES

The fact that gold ores of the district contained tungsten was first noted by the Yellow Aster Mining and Milling Company several years ago, and four Standard concentrators were installed to save this mineral. It was found after trial, however, that the percentage of tungsten in the ores of that mine was not sufficiently high to defray the cost of treatment, and the attempt was abandoned.

At the Sydney mine, six miles southerly from the Yellow Aster, the presence of tungsten in some of its gold ores, has been known for three or four years. A small amount of ore from this mine has been treated for tungsten over a Woodbury table.

Realizing the commercial possibility of the gold-tungsten ores of this district, the Stanford Mining and Reduction Company, operating the Red Dog custom amalgamation mill, at Johannesburg, has recently installed a New Standard concentrator, and is treating custom ores for gold and tungsten.

OUTLINE OF CONCENTRATION METHOD NOW EMPLOYED

The ores are stamped to pass a 50-mesh slot screen, using 6-in. discharge and 5½-in. drop; are first plated and then concentrated. Much difficulty has been experienced in this method of treatment. On account of the extreme weight of the tungsten, the plates are badly scoured, and it is with great difficulty that amalgam is retained on the plates. Although particles of amalgam are frequently found on the table, it is impossible to employ an amalgam trap on account of the density of the concentrate collecting in the trap. Amalgam collecting on the battery plates is extremely hard and brittle. At the cleanup, the corners of the battery are found to be solidly caked with the ore. The loss of tungsten is from 20 to 30 per cent. A portion of this loss is on account of the employment of insufficient settling boxes, while the larger portion of the loss occurs in the tailings, and could probably be somewhat remedied by the employment of a second table in series for the richer ores; and by the use of a canvas table for the lower grade material.

PLACER TUNGSTEN

Tungsten occurs in both the gulches of recent origin and the glacial channels of the Stringer district. The present gulches slope generally in a southeasterly direction, while the channels, which are now filled with débris, firmly cemented together, bear more in a southerly direction.

In 1898 over 100 men were employed in dry-washing parts of these gulches and channels, and much difficulty was experienced in these operations on account of the accumulation on the riffles of what was then mistaken for heavy spar, or barite. When the riffle board became filled with this material, it was carried to the camp of the digger, on the bank of the gulch, the gold removed by amalgamation, and the tungsten discarded as worthless. A considerable amount of tungsten accumulated on the banks of the gulches in this way. Later floods distributed these piles over the surface of the gulches. The material accumulated in this way was recently scraped up and milled.

VALUE OF SCHEELITE UNKNOWN IN EARLY DAYS

During the early operations, the bottoms of many of the gulches were honeycombed with workings by these miners in

their quest for gold, and it is stated that pieces of scheelite weighing several pounds were found in places. These pieces of ore were used in the construction of pillars for the retention of ground. It is also stated that seams of scheelite, in place, were found, but as they were not considered valuable, no record of their locality was preserved. Most of these old workings have caved in, and are now inaccessible.

An attempt is being made to operate unworked portions of the placer deposits, both for gold and tungsten. For experimental purposes, a small jig was built, having two compartments, in one of which is situated the jig box having a screen bottom with 3/32-in. apertures. In this way the coarse pieces of tungsten accumulate in the jig box, the placer gold and fine tungsten sinking to the bottom of the jig-box compartment. The gravel to be jigged passes through a 5/8-in. screen, while the oversize is hand sorted for large pieces of ore. The material settling in the jig-box compartment is hauled to the custom mill, stamped and amalgamated, the concentrates being saved as before described. The accumulation in the jig box itself, is comparatively pure, and requires no further treatment.

Placer tungsten occurs in pieces from a millimeter to several inches in diameter. In most cases these pieces are rounded and nodular in appearance indicating that they have either traveled a long distance, or that a considerable amount of material has been washed over them.

In the immediate vicinity of the Atolia mines, where bedrock was not over four or five ft. below the surface, the overburden has been removed, and large pieces of tungsten gathered by hand.

FIELD TESTS EMPLOYED

Tungsten ore of sufficient percentage to be valuable can usually be detected by its weight, being, in its pure state, about twice as heavy as quartz. The tests employed by prospectors in this district, while simple, are nevertheless, accurate.

A small amount of the ore is crushed, placed in a test tube or any other vessel of glass which may be available, and a small quantity of concentrated hydrochloric acid is added. This is heated to the boiling point, and should be boiled for a moment, when a scrap of metallic tin or zinc (preferably tin) is added. If tungsten be present the solution immediately becomes azure blue.

Another test which is fairly delicate is by fusion in a reducing flame with a salt of phosphorus. In the oxidizing flame no color is obtained, while in the reducing flame, the bead becomes a fine blue, which changes to blood red upon the addition of ferrous sulphate.

In making quantitative determinations, the method described by Prof. R. C. Ben-

ner, of the University of Arizona, is in common use and is found satisfactory for ordinary commercial purposes.

BENNER'S METHOD FOR TUNGSTEN

Fuse the ore with a mixture of sodium and potassium carbonate, and dissolve in hot water. The tungsten goes into a solution with sodium silicate, as sodium-potassium tungstate. Filter and wash with hot water, and if there is any residue which has not been disintegrated by the first fusion, it must be re-fused, as in the first case, and again treated with boiling water, filtered and washed with hot water. This alkaline tungstate is evaporated to dryness with nitric acid, moistened with nitric acid, and the evaporation repeated, when the silica is heated to about 120 deg., to dehydrate it. This dry mass is moistened with nitric acid, and allowed to stand several minutes. It is then taken up in a weak solution of some such salt as ammonium nitrate, which is added to the water to prevent the formation of a pseudo-solution of tungstic acid. Filter and wash with a slightly acid salt solution until free from alkaline salts. The precipitate is now transferred to a platinum crucible and ignited with free access to the air. This gives the impure tungstic oxide. This ignited residue may contain silica. The silica is removed by treating with hydrofluoric acid, evaporating to dryness, and igniting.

Magnetometric Surveys of Adirondack Iron Deposits

For several months magnetometric surveys of the magnetite deposits in the Saranac formation of the Eastern Adirondack region of New York have been carried on for Witherbee, Sherman & Co. For this work a Thalén-Tiberg magnetometer was used under the direction of S. H. Hamilton, mining geologist for Hamilton & Hansell, of New York. The magnetometric surveys were undertaken with a view of defining the orebodies and more intelligently outlining a campaign of diamond-drill prospecting. At one place the survey has indicated ore for over a mile in length, the vein being about 20 ft. wide, and having a nearly vertical dip. One diamond-drill hole recently sunk cut this vein at a depth of 333 ft. From the same point, but at different angles, other diamond-drill holes will be driven to prove the orebody as indicated in the magnetometric surveys. This vein is now to be called the Norton vein in honor of the general manager of the Mineville properties of Witherbee, Sherman & Co.

The deposit is in what is known as the Arnold Hill district, of Clinton county, New York, and is a magnetite ore low in phosphorus. It runs from 40 per cent. iron upward, and will have to be concentrated magnetically. There are

other outcrops of ore of this character in the Arnold Hill district and additional surveys are underway about two miles west of the Norton vein to determine the approximate extent of these deposits.

Rapid Estimation for Free Calcium Oxide in Commercial Lime

The following is an abstract of the results of an investigation by L. W. Bahney¹ and is intended primarily for control work on impure burnt lime:

The principle of this process depends upon the titration of the samples of lime with a standard solution of oxalic acid, using phenolphthalein as an indicator. For purposes of experiment, calcium oxide was first prepared by taking pure crystals of calcite, grinding in an agate mortar, and igniting in a platinum crucible to constant weight. By this method it was determined that 14.6068 grams of oxalic acid to the liter of water was required for making the standard solution. The weight of lime taken for a sample was always 650 mg. This weight of sample was introduced into a 300 cc. Erlenmeyer flask containing 50 c.c. of distilled water with a few drops of the indicator, and then titrated with the above oxalic-acid solution. The reading of the burette then gives per cent. of calcium direct.

INTERFERING ELEMENTS

Silica does not interfere with this determination. Magnesia, as it is slightly soluble in water, interferes only slightly. However, after a little practice the CaO end point is readily recognized, for the color up to that time remains a vivid pink, while MgO gives only a faint pink and the color disappears with 0.1 to 0.2 c.c. of the oxalic-acid solution and the color returns slowly and feebly, while the color returns quickly and sharply as long as any free lime is present.

MANIPULATION

After placing the sample and the distilled water in the flask, the flask should be stoppered and shaken vigorously for about 10 seconds, then the solution of phenolphthalein added and the addition of the oxalic-acid solution begun. During the time of running in the oxalic acid the flask should be shaken as vigorously as possible, care being taken not to allow any of the contents to splash out. If after the color has once disappeared it returns, there is a little more unsatisfied lime present, providing the returned color be of a vivid pink. But if the color returns slowly and is of a faint pink, the end point has been reached. The phenolphthalein solution should be made by dissolving 0.5 gram in a mixture of 50 cc. alcohol and 50 cc. water.

¹Journ. Ind. and Eng. Chem., Oct., 1910.

The Manufacture of Sublimed White Lead

Blast Furnaces Run to Produce Fume. Only Two Plants in the United States Use the Process. Product Is a Basic Lead Sulphate

B Y J. I. B L A I R *

As there are only two plants in the United States engaged in the manufacture of sublimed white lead and as these plants are identical in general arrangement, this article will embrace a description of both plants.

The plants consist, as shown in Fig. 1, of two furnaces, about 30 ft. of combustion chamber, a large brick tower *B*, two smaller towers, a set of goose-necks *C*, a bag room *G*, packing room and coopeage.

Both plants were designed to convert the flue dust and blue fume of the regular lead blast furnace into the marketable white-fume pigment, basic lead sulphate, and thus rid the lead smeltery of the most troublesome article with which it has had to contend.

The furnaces, Fig. 2, which are known as slag-eyes, are the most important part of the plant and are situated at *A*, Fig. 1. Both solid and sectional shells are being used. There are six 3-inch tuyeres spaced about half way between the top and bottom of the furnace and directed, as shown by the broken lines in Fig. 2. Originally there were two rows of tuyere openings, but these have been replaced by the single row as just described. The life of the furnaces is about three months, when they are removed and relined. The furnace shell as shown in Fig. 2, costs less than \$400 and may be made in any boiler shop.

COMBUSTION CHAMBERS OF BRICK

The combustion chamber which runs directly over the furnaces at both plants is built of brick and supported by iron columns, shown in Fig. 3. At one of the plants the space directly over the furnaces is water jacketed, at the other plant the entire chamber is built of brick and lined with either fire clay or brick.

The top is covered with zinc retorts 10 in. in diameter by 4 ft. in length, shown in Fig. 3. The air circulating through these cylinders (the closed end of the retort is broken out) tends to keep them cool and the fact that they may be removed when burned out, and replaced by new ones, is a valuable feature of this mode of covering. Too many water jackets tend to cool the fume too quickly for the best results.

*Student, Lehigh University, South Bethlehem, Penn.

ENGR. AND MIN. JOURN., Vol. 40, p. 4.

The space *C*, Fig. 3, is filled in with fire clay.

At each of the two existing plants the towers are identical; the first, *B*, is 10 ft. in diameter by 20 ft. high, inside, and is lined with firebrick and braced with seven 60-lb. rails spaced equidistant and placed vertically around the tower, tied with 1½-in. tie rods encircling the tower; one at the base, one near the middle and one near the top.

neck rests on a hopper from which the fume is collected daily, and either trammed to a bin or packed directly into barrels, and sold as an inferior-quality pigment, mostly to the rubber trade.

As the goose-necks cool the fume, all the dust and PbO drop out leaving the pure basic sulphate to enter the bags. The pigment collected from the goose-necks (about 3500 lb. daily) has a decided pink color due to free PbO present.

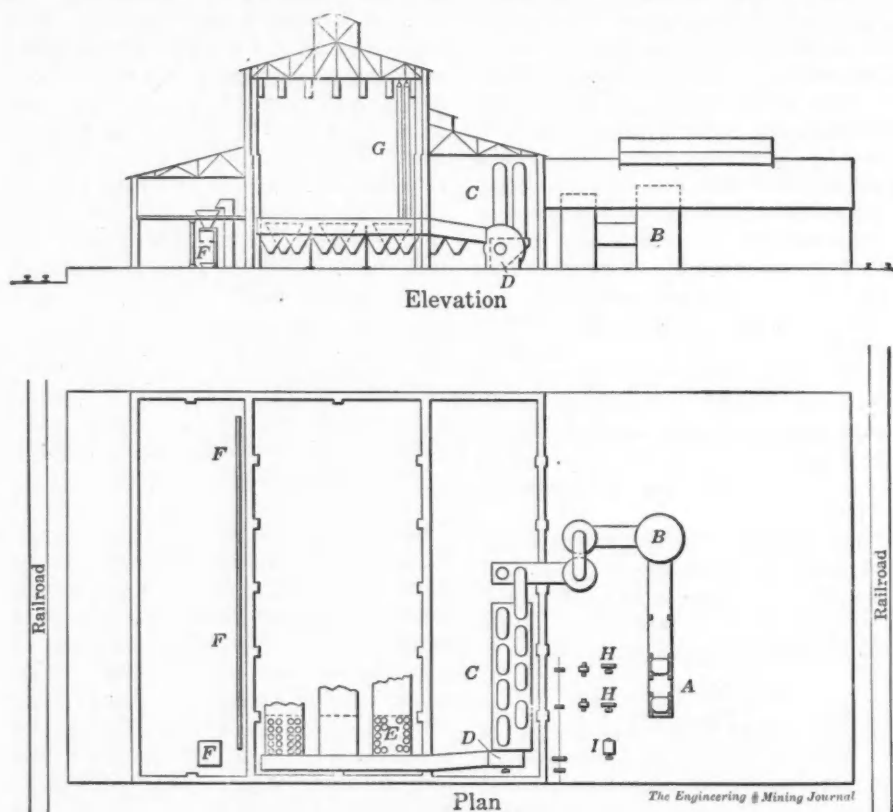


FIG. 1. SUBLIMED WHITE-LEAD PLANT

The two smaller towers are sheet-iron shells lined with a 4-in. red-brick wall. These two towers are connected by means of an inverted V goose-neck, 44 in. in diameter. Each tower is provided with a clean-out door at its base.

FUME CONDENSING APPARATUS

The fume enters the first tower near its top, passes out near the base into a short conduit which leads to the second tower and then emerges by way of the goose-neck at the top and enters the top of the third tower. From this tower the fume goes into the goose-necks shown at *C*, Fig. 1.

There are seven of these goose-necks 44 in. in diameter by 25 ft. high, made of 14-gage sheet iron. Each goose-

neck passes through the seven-foot fan *D*, Fig. 1, and into the bags in the bag room *G*, which contains 540 woolen bags. These rooms are similar in arrangement to the bag room described by W. R. Ingalls in his "Lead Smelting and Refining," page 245, to which the reader is referred for a complete description of these bag rooms.

The bags used in the sublimed-lead plant are made of unwashed woolen cloth and are 20 in. in diameter by 30 ft. in length. The natural oil in the wool protects them from the corrosive action of the hot gases.

Adjoining the bag room is the packing room, over which is situated the cooper shop. In the packing depart-

ment we have the one point of difference between the two plants. In the plant shown in the accompanying illustration, the pigment is packed by machine, in the other plant the pigment is packed by hand. In Fig. 1, the packer is fed by the screw conveyer, FF.

SIMPLE MECHANICAL EQUIPMENT

The machinery required to run the plant is as follows: Two No. 7 Sturtevant blower fans H H, Fig. 1, which furnish the required blast under 4½-oz. pressure; these fans are driven by two 30-h.p. motors. One 7-ft. fan shown at D, Fig. 1, driven by one 50-h.p. motor. One freight elevator and a 20-h.p. motor for same. One packer with screw conveyer and elevator with a 20-h.p. motor. All motors use alternating current.

As all of the materials used in making up the charge arrive at the plant ready for mixing, the process begins with the

high in lead. The blue fume comes from the blue baghouse. The ashes are the settlings that accumulated in the trails near the blast furnace and open hearths. The gray slag is from the open hearths.

FURNACE CHARGE FOR MAKING SUBLIMED WHITE LEAD.

MATERIAL.	POUNDS.
Galena.....	6000 to 7000
Cuttings.....	1000
White Waste.....	1000 to 1500
Iron.....	900
Lime.....	1400
Black Slag.....	1000 to 3000
Blue Fume.....	3000
Ashes.....	2000
Gray Slag.....	2000
Coke.....	6000 to 8000

This charge is fed through the openings B, Fig. 3, in small shovelful lots. The feeding is practically continuous. The feeder throws the charge in such a manner as to cause it to fall evenly over

AIR DRAFT THROUGH FEED DOORS A NECESSITY

In Fig. 3, it will be noticed that the openings B which serve as feed doors are simple openings and as there is a strong suction at this point a great deal of cold air is continually rushing into the combustion chamber. This air furnishes the oxygen necessary for the formation of the PbSO₄ and PbO. The heat produced by the formation of these compounds—basic lead sulphate and the PbO in the free state—no doubt tends to counterbalance the cooling effect of the intruding cold air.

The slag, which is very silicious, is tapped at A, Fig. 3, and is allowed to flow continuously, along with the small amount of lead which is present, into a settling basin shown in Fig. 3. From this basin the lead is ladled into the molds, while the slag overflows into a water pot just below the lead pot.

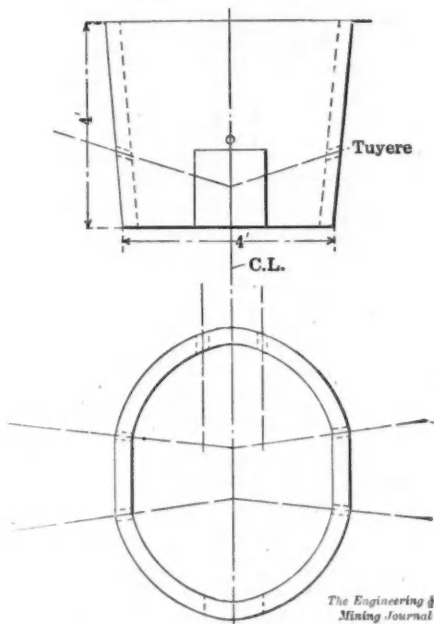


FIG. 2. SLAG-EYE FURNACE

delivering of the charge to the feed platform.

BLAST FURNACE CHARGES

In the following list, which represents an average charge, the galena is a table concentrate free from zinc and thoroughly dry, "cuttings" are the material taken from the combustion chamber, near the furnaces, during clean-outs and consist of a mixture of fused lead sulphate and slag. The white waste is the sweepings from the bag room and packing department including such of the pigment which may be below standard in color. The iron is boiler scale, tin cans and sweepings from machine-shop lathes. The tin cans serve to keep the charge open. The limestone is purchased in the form of "fines," to pass a 40-mesh screen. The black slag is that slag from the slag-eye running

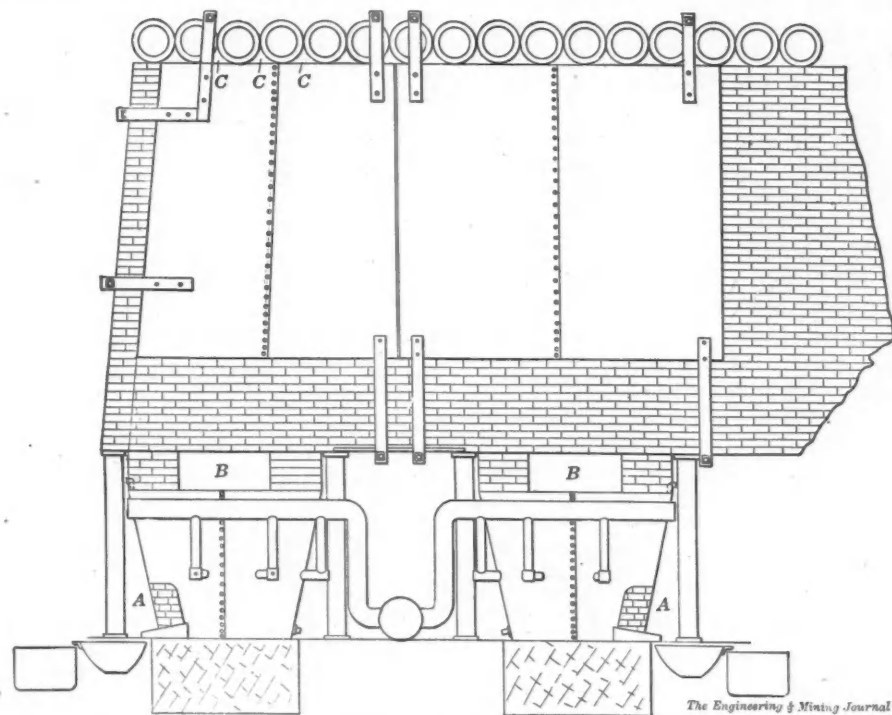


FIG. 3. FURNACES AND COMBUSTION CHAMBER

the glowing mass inside the furnace. By this method of feeding, the surface of the charge in the furnace is kept at a white heat, a condition which insures the immediate volatilization of the galena and other lead compounds making up the charge. However, this is not all that the high temperature must accomplish; it must maintain a sufficiently high temperature throughout the combustion chamber to insure the complete oxidation of any combustibles which may be drawn over into this passage by the strong draft.

The temperature must also be sufficient to keep the lead in the state of fume until it shall have had time to come in contact with the oxygen of the air to form the basic sulphate.

TEMPERATURE OF COMBUSTION CHAMBER IMPORTANT

The temperature of the first tower, an important point, is kept as near to 800 deg. C. as is possible. At this stage of the process a knowledge of the temperature of formation, decomposition and condensation of the pigment is essential to the proper management of the plant.

In no other metallurgical operation, to my knowledge, does the temperature of the furnace so influence the quality of the product. Gordon² said that even the direction of the wind exerted a great influence over the quality of the output of his zinc plant. The same is true to a certain extent of the product of the

²ENG. AND MIN. JOURN., Vol. 83, p. 680.

sublimed-lead plant. Too low a temperature not only causes the production of the objectionable compound PbO in excess—more than will combine with the PbSO₄, but will also cause too much pigment to settle in the trail with the ash and dust.

On the other hand, too high a temperature burns the bags, fuses the pigment, near the furnaces, thus choking the combustion chamber, and may also break down the newly formed pigment liberating a part of the PbO which discolors the pigment.

By changing the speed of the large fan the temperature of the interior of the combustion chamber may be controlled to a certain extent and a fairly uniform heat maintained throughout the conduit.

COLLECTION OF PIGMENT

Twice during each eight-hour shift the bags are shaken and the pigment collected from the hoppers *E*, Fig. 1. Depending on the subsequent treatment the pigment is either dumped into the screw conveyer *F F* which delivers it to the packer, or it is carted to the packing department, where it is shoveled into barrels and packed by hand—500 lb. to the barrel.

The screw conveyer was not installed to deliver the pigment but rather to work it up and thus rid it of the mechanically included air and gas which had heretofore caused the complete failure of all attempts at mechanical packing. Gordon was the first to use this scheme but whether or not he hit upon the device by accident, I am unable to say. To Evans W. Buskett is due the credit of having successfully applied the mechanical packer to the sublimed-lead plant.

The cost of actual operation for 24 hours is given in the accompanying table.

DAILY OPERATING COSTS FOR 152-TON PLANT.

6 Feeders	@ \$2.00	.....	\$12.00
6 Slag Tappers	@ 1.75	.....	10.50
6 Pot Men	@ 1.65	.....	9.90
1 Packer	@ 2.00	.....	2.00
6 Bag Shakers	@ 2.00	.....	12.00
9 Laborers	@ 1.65	.....	14.85
3 Foremen	@ 2.25	.....	6.75
1 Cooper	@ 3.00	.....	3.00
38 Men	.....	Total wage	.....\$71.00

Both plants have the same capacity—about 15 tons per unit of two furnaces per 24 hours. The quantity of pig lead unavoidably produced varies so widely that no attempt is made to give an average daily output: Some days the furnaces turn out only a few bars; again when the furnaces are out of order as many as eighty pigs are produced in one shift of eight hours. This lead is a shiny, white hard metal because of the impurities which are reduced at the high temperature of the furnace.

Another Railroad into Northern Colorado Coalfields

DENVER CORRESPONDENCE

The Yampa coalfield is apparently likely to be reached in 1911 by the Laramie, Hahns Peak & Pacific railway, which is now operating its road from Laramie, on the Union Pacific railroad, to Fox park, within about 40 miles of the anthracite and bituminous seams at the northeast corner of the above coalfield. This line is projected across the continental divide, over a low pass, with a maximum grade of 2 per cent., and on reaching Hahns Peak and Columbine, will be on a level (about 8000 ft. elevation) with the anthracite seams, and only about six miles distant in an air line. From thence the line is projected down the Elk River valley, with its 18 miles of fine ranches, to Steamboat Springs; from thence it is projected westward directly through the center of the 1200 sq.mi. of bituminous coals¹, to the hydrocarbon deposits of Uinta county, Utah.

The Denver, Northwestern & Pacific railway (Moffat road), with its present terminus at Steamboat Springs, has projected and surveyed lines running westward into eastern Utah, with Salt Lake City as its objective point. Its president, D. H. Moffat, has, however, recently stated publicly that the date of its construction westward is indefinite, and as the Laramie, Hahns Peak & Pacific, which is an independent enterprise, is a feeder to the Union Pacific, it may be assumed that the former will have at least the friendly support of the latter powerful system, and therefore in all probability will be the first to develop the coal and other mineral resources of Routt county, Colorado, and eastern Utah.

In addition to these, the Laramie, Hahns Peak & Pacific line already reaches the coal deposits of North park, in Jackson county, Colorado, where a seam from 40 to 65 ft. in thickness has been opened in the vicinity of the towns of Waldon and Hebron.

Besides the carbonaceous riches of the region traversed, there are the metalliferous ores of the Hahns Peak region, which are of an average grade too low to bear wagon transport about 32 miles to the present nearest railroad point at Steamboat Springs. With a railway passing the dumps, as indicated by the survey of the Laramie, Hahns Peak & Pacific, the products of the existing mines will pay for marketing, and numbers of what are at present mere prospects will be developed. Moreover the line will pass directly through the Hahns Peak placer region, which in the last 25 years had produced \$1,500,000 in gold, but has long been idle, owing partly to the imperfect

¹Bull. 297, U. S. Geol. Surv., by Gale and Fenneman.

construction of the 33-mile ditch which brings the water from Farwell mountain, and partly to litigation. All this work will now be revived.

There is a market today east and west of Laramie for more of the bituminous and anthracite coal of the Yampa field than the Laramie, Hahns Peak & Pacific can haul over a single-track line. Its president and leading spirit is Isaac Van Horn, of Boston.

Experimental Magnetic Concentration Plant in Canada

SPECIAL CORRESPONDENCE

An announcement published in the official gazette gives the following information relative to the provision for a national experimental testing plant, concerning which those desiring specific information are invited to address Director Eugene Haanel, at the Canada Department of Mines, Ottawa, Ont.

The Mines Branch of the Canada Department of Mines is installing in Ottawa an experimental testing plant for the concentration of magnetic ores. When completed, the plant will consist of a standard Gröndal concentrating unit, comprising an ore crusher, ball mill, and two Gröndal magnetic separators operating in tandem; the capacity of the plant being from two to four tons of crude ore per hour. The plant is being installed for the purpose of testing low-grade magnetic iron ores and sands, with a view to proving their amenability to concentration by the Gröndal wet system. Tests will be carried through for the determination of the following points: Extent of crushing required to raise the iron content of the crude ore to 65 to 70 per cent. in the concentrate; extent of crushing required to depress sulphur, phosphorus, or titanium contents to percentages acceptable to furnacemen; number of tons crude ore that are required to produce one ton of concentrate; power consumed per ton of crude ore concentrated; cubic feet of water used per ton of crude ore concentrated; it is expected that the plant will be ready for operation about the first week in November, 1910. Tests will be made free of charge on Canadian ores, but it is required that shipments shall be delivered, carriage paid, at the testing plant at Ottawa. Shipments of ore for testing purposes should not be less than five nor more than 20 tons; and it is particularly requested that shipments be made in bags containing not more than 100 lb. of ore each, to facilitate handling.

There were 1,777,653 long tons of manganese ore imported into the United States from 1900 to 1908, inclusive, as against a domestic production of 60,001 tons.

Bedded Copper Deposits of Carangas, Bolivia

Ore-bearing Strata 600 ft. Thick and Outcrops for Two Miles; Ore in Beds 1 to 16 ft. Thick. Mining Conditions Favorable; Labor Plentiful

BY ROBERT HAWXHURST, JR.*

At the present time the annual production of copper in the Republic of Bolivia amounts to about 5000 tons. Of this over half comes from the mines of the Coro Coro district, while the remainder is derived largely from the ores of the several silver mines in the country, notably from the Pulacuyo mine, at Huanchaca.

LACK OF TRANSPORTATION FACILITIES HAS HAMPERED MINING INDUSTRY

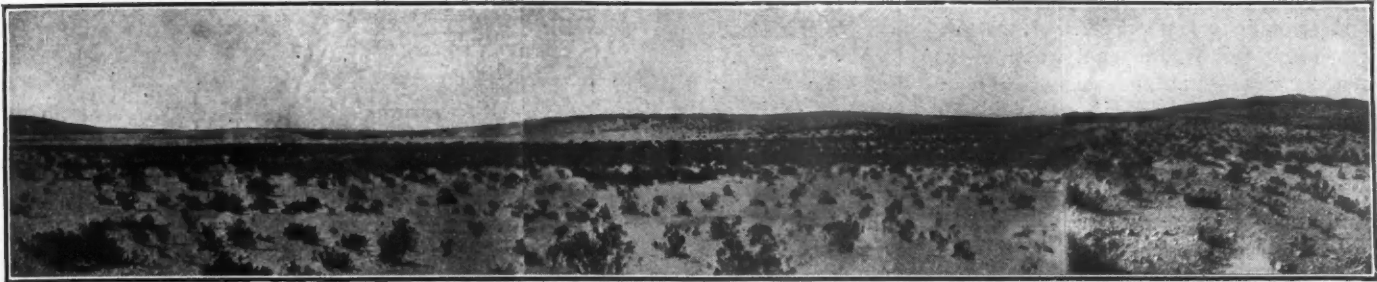
That a country so rich in mineral should supply such an insignificant por-

routes, to the seaports of Antofagasta and Mollendo, in the neighboring republics of Chile and Peru. From Oruro to Antofagasta, over the line of the Antofagasta & Bolivia Railway, the distance is 574 miles, while La Paz is 600 miles distant from Mollendo by lake-steamer and rail.

Naturally only the more valuable minerals can be mined under conditions which impose such a burden of transportation costs and the many attractive copper deposits of the republic have remained neglected while, for years past,

decided to build further branch lines from Uyuni to Tupiza and from Oruro to Cochabamba.

The impetus to the mining industry of Bolivia, given by the opening of these new lines of transportation, promises to be phenomenal and will undoubtedly result in reawakening an interest in what is probably the country richest in mineral resources in the world. Her copper deposits will receive their due share of attention and before long Bolivia will surely take rank among the nations producing this metal.



PANORAMA OF THE CARANGAS COPPER DISTRICT, BOLIVIA



SHEEP CORRAL AT CARANGAS BUILT OF 5 PER CENT. COPPER ORE



THE PLAZA AT CORQUE, CAPITAL OF THE PROVINCE OF CARANGAS

tion of the world's copper appears at first anomalous, but a glance at the map of South America explains the situation. Bolivia, situated in the center of the continent, possesses no sea coast, and is furthermore cut off from access to the Pacific by the towering barrier of the western cordillera of the Andes. The cities of Oruro and La Paz, in the heart of the region of mining activity, are but 180 miles from the sea coast as the crow flies, yet their commerce finds outlet to the Pacific only by means of long and tortuous railway

all energy has been centered in the mining of tin and silver.

NEW RAILROADS BEING CONSTRUCTED

This condition of affairs, however, promises to be completely altered in the near future, as a result of present activity in railway construction in Bolivia and more especially with the completion of the line from Arica to La Paz, which will place the latter city in direct rail communication with the sea coast, only 200 miles away. In addition to this the Antofagasta & Bolivia Railway is constructing a branch to the old mining district of Potosi and has de-

CARANGAS COPPER DISTRICT PROMISING BUT LITTLE KNOWN

Of the many noteworthy Bolivian copper deposits, the Carangas field figures as one of the least known but most promising. It lies 85 miles from Oruro, in the western extremity of the Titicaca basin or Bolivian plateau, at an elevation of 12,000 ft. above sea level; latitude 8 deg. 10 min., south; longitude 68 deg. 12 min., west. It is best reached from the Chilean seaport of Antofagasta by rail to Oruro, and thence by a three-day journey on mule back, across the level reaches of the

*Mining engineer, Hawxhurst & Wolff, 623 Salisbury House, London, E. C.

tableland, to the village of Turco, a nearby Indian town.

RAILROAD PASSES THROUGH INTERESTING COUNTRY

The journey is one of never-ending interest. From Antofagasta the train crosses the first low range of the coastal Andes and enters the desert of Atacama, one of Chile's richest nitrate fields. Low barren hills and arid sandy plains stretch far away on either side of the line, dotted here and there by the smoke and buildings of the nitrate factories. Then come the green fields of Calama, a veritable oasis in the desert, watered by the Loa river. Beyond Calama, the Chuquicamata and Conchi copper districts are left to the northward. The Loa river is crossed on a steel viaduct 350 ft. above the waters of the stream, next to the Gotiek viaduct in Burma, the highest bridge in the world.

Leaving the Loa, the snow-capped and smoking volcanic peaks of the Andes began to appear and crossing the summit at Ascotan the railway borders the wonderful borax lake at Cebollar and enters the great Titicaca basin, the bed of an ancient sea, with terraced beaches upon the mountain sides. From here on to Oruro the line runs over the almost level bed of this dead sea, dotted here and there with alkali lakes and great marshes encrusted with salts, glistening in the sun like vast fields of snow.

MULE-BACK JOURNEY THROUGH LAND OF THE AYMARA INDIANS

From Oruro the journey is continued on mule back across the level plain, through the land of the Aymara Indians, who still retain the speech, customs and dress which characterized their forefathers when they flourished under the dominion of the bygone Incas at Cuzco. Their flocks of sheep, alpacas and llamas graze by the wayside and their grain fields, paddocks and farmhouses line the road. These latter are built of large blocks of sun-baked mud, no wood entering into their construction. They are beehive in shape, and in size and in style of architecture, are identical with the snow igloos of the Esquimaux.

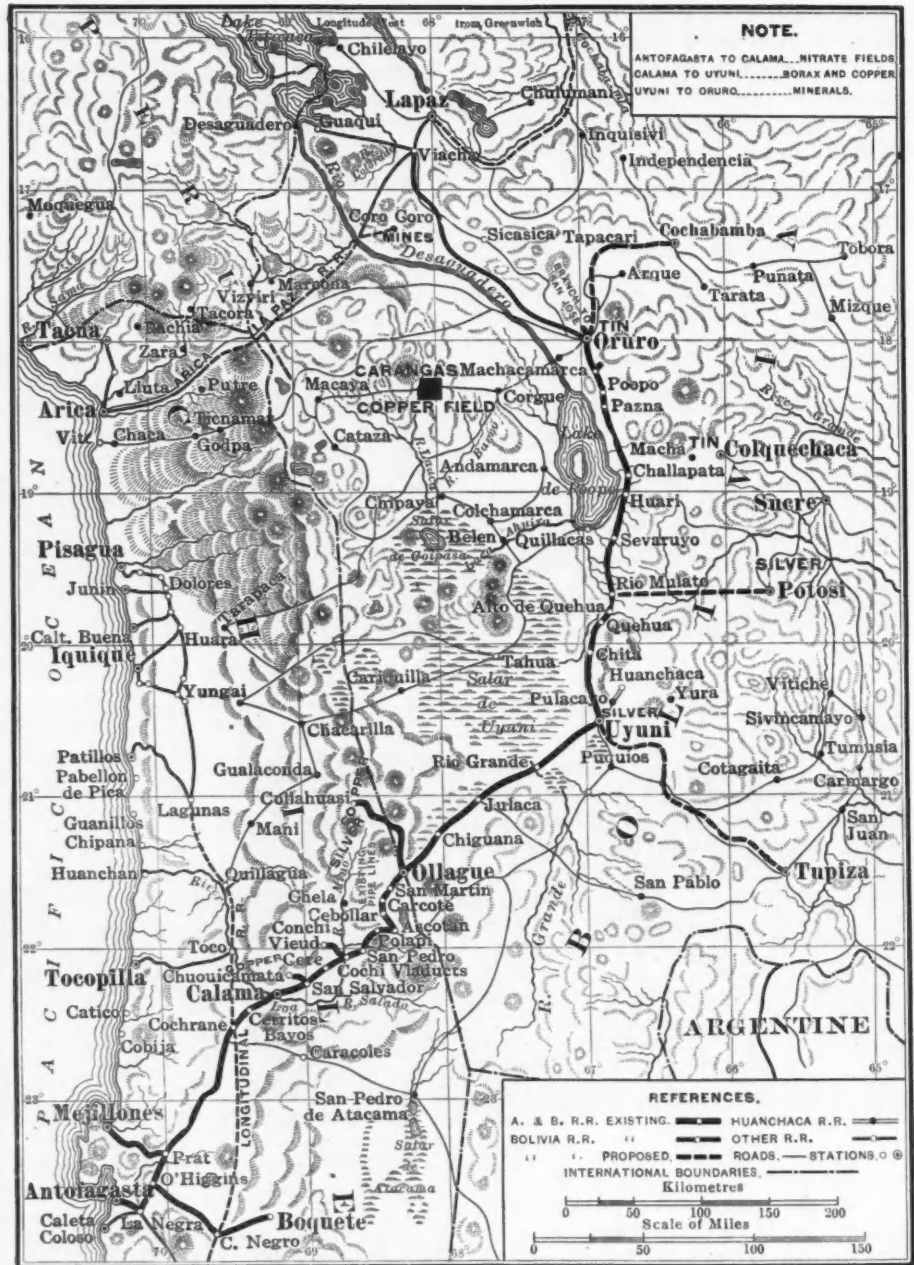
Occasional towns are passed, peopled by these same Indians, the towering domes of their churches being visible for many miles across the plain. The Aymaras are small and wiry. Their features are pleasing and their habits cleanly. They are kind and hospitable but inclined at first to be shy, and distrustful of the stranger. They live in comparative comfort from the returns from their flocks and fields. They are ardent Catholics and their village church, with its kindly priest and gay

fiestas, is the central pivot of their entire existence.

COPPER DEPOSITS OCCUR IN FAULTED BEDS ON FLANKS OF EXTINGUISHED VOLCANO

The hills of Oruro, rising like a huge island out of the plain of the lake basin, consist of Silurian and Devonian slates and schists, uplifted by Tertiary eruption. They are lined by beds of fossil coral which were probably de-

of Corque, where the tilted sandstone beds, of the upper and middle Permian, first appear, in the form of a range of rugged hills extending to the northward, the strata dipping to the west. Over the range lies the valley of Umamarca, the axis of the uplift, beyond which is a second range of sandstone hills, the beds of which dip to the eastward. Crossing this range the floor of the plateau is again encountered, and from it rises



RAILROAD MAP OF BOLIVIA AND ADJACENT COUNTRY

posited in the ancient sea of which the great plain was the bottom. In places the beds of sedimentaries have been so tilted that the coral outcrops are almost vertical and their rugged outlines, silhouetted against the sky, resemble the ruins of some half-demolished wall or battlement.

To the westward the level plain, crossed by a few sluggish streams, stretches unbroken almost to the town

the extinct volcano of Llallagua, about whose flanks are uplifted sandstones and conglomerates of the lower Permian. In the disturbed and faulted beds of this region, lie the Carangas copper deposits.

TWO POSSIBLE RAILROAD ROUTES TO THE COAST

The locality, politically, is in the canton of Turco, province of Carangas, de-

The Engineering & Mining Journal

partment of Oruro, midway between the villages of Turco and Llallagua, while geographically it lies in the northwestern extremity of the great Titicaca basin, near the foothills of the western cordillera of the Andes, whose summit here marks the boundary between Bolivia and Chile.

There are two possible railway routes from the copper field to the sea coast: (1) By constructing 100 miles of narrow-gage railway from the mines to Sevaruyo station on the Antofagasta & Bolivia Railway, whence the distance over this road to the port of Antofagasta is 470 miles. (2) By building a branch 70 miles to the northward, to connect with the Arica-La Paz Railway and thence 200 miles over this road to the port of Arica. The Arica-La Paz Railway is now in course of construction by the British firm of Sir John Jackson & Co., and will be in operation about the end of 1911.

hills of the Cordillera Real or coastal range of the Andes, formed of trachyte, rhyolite and andesite, the intervening plain being filled with recent sands and clays. The immediate hills of the deposit comprise tilted beds of red, green and gray sandstone, with intercalated beds of shale and conglomerate, and extend to Llallagua mountain, a twin-peak cone of ancient granite about five miles to the southward.

To the eastward four miles distant, is a range of red sandstone hills, extending in an almost unbroken line to the old Coro Coro copper district, 90 miles to the northward. This sandstone area has a width of 20 miles and the beds graduate from the lower to the upper Permian, striking 20 deg. West of North and dipping at varying angles to the eastward.

The red-bed series, extending from Coro Coro to the Carangas district are more or less copper bearing throughout

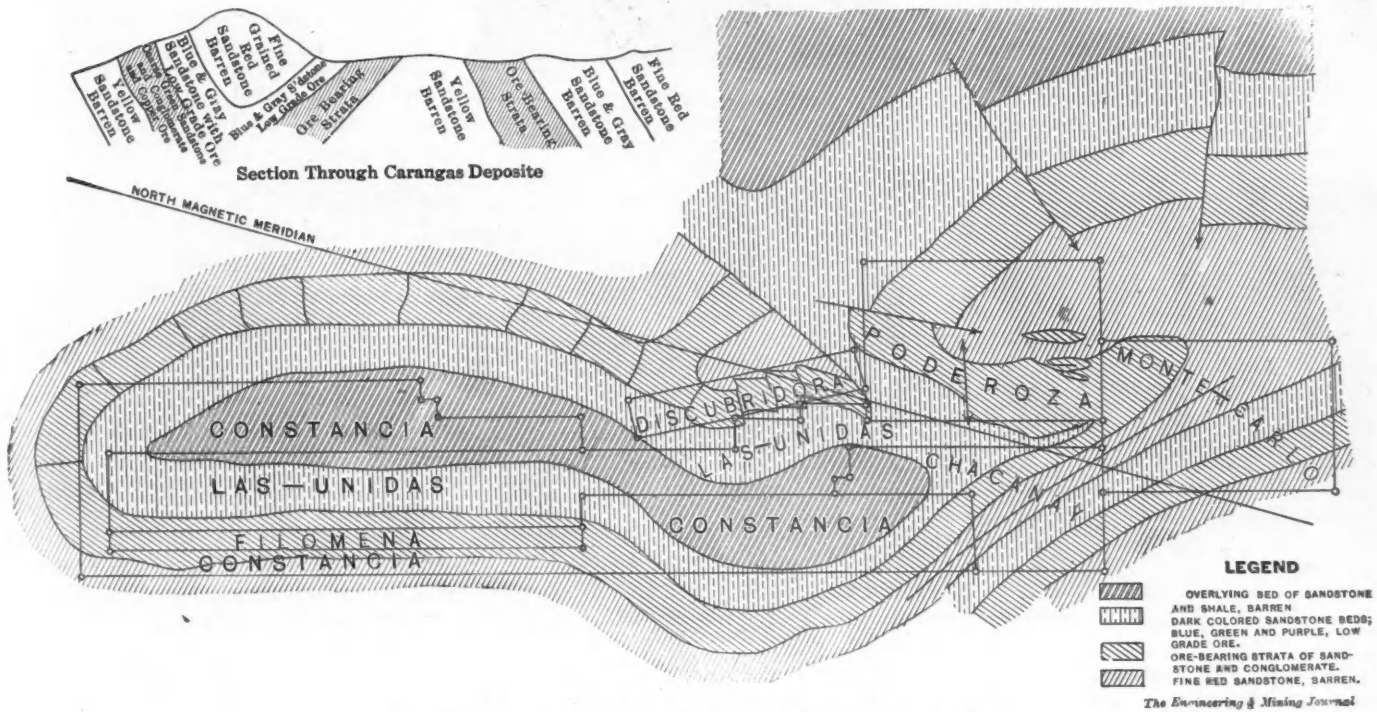
tain native copper in appreciable quantity, in the form of grains, plates and nuggets.

BEDS OUTCROP FOR TWO MILES

Beneath this comes the horizon of economic importance, consisting of alternate layers of coarse, red to gray sandstones and fine conglomerates. These orebeds vary in width of from 1 to 16 ft. and the rock is impregnated with and cemented by carbonates, oxides and silicates and carries native copper, glance, cuprite and other secondary sulphides. The average total thickness of this ore-bearing strata is about 600 ft. and its outcrop can be traced for a distance of two miles or more.

COPPER PRECIPITATED DURING SEDIMENTATION

The genesis of this ore deposit is obscure and conclusions in this regard must be deferred until such time as the



GEOLOGIC SKETCH MAP OF CARANGAS COPPER DEPOSITS

This latter route is by far the most inviting, reducing the total haul to the sea coast to 270 miles. The 70 miles of connecting line would be built at a comparatively light cost over the almost level plain. A temporary wagon road for use of mule carts or motor traction, would not involve a great outlay.

EXPLORED MINERAL AREA COMPRISES ABOUT 2500 ACRES

The limits of the explored mineralized zone comprise about 250 acres, covering a low range of rolling hills, which rise gently out of the plateau on the northern flank of Mount Llallagua. The country rock of the district is red sandstone of the Permian series. Six miles to the westward begin the foot-

their extent. While as a whole the tilting of these beds was caused by the great Andean uplift, their extreme disturbance in the vicinity of the Carangas district is due to their proximity to the igneous mass of Llallagua mountain, and the rich ores in their bleached portions are purely a local occurrence, confined to a comparatively restricted zone of faulting and fissuring.

Here the overlying beds consist of fine-grained red sandstone, devoid of copper. Beneath this is a darker layer, weathered and sometimes bleached, carrying unimportant quantities of silicates, carbonates and native copper, except in the vicinity of fault planes and shattered zones, where the cementing veinlets and stockworks of quartz, con-

uncovering of the beds permits of more detailed investigation. I am, however, inclined to favor the theory of precipitation simultaneous with sedimentation, with subsequent readjustment and concentration, by means of infiltration, following faulting and fracturing by volcanic or seismic disturbance.

DEPOSITS EXTENSIVELY WORKED IN PAST

The copper-bearing quartz veins and stockworks were extensively worked by the Indians in times past, probably during the Inca regime, and in places the ground is dotted with half-filled pits and mounds of debris, the remains of their mining operations. One still hears tales of finds of curious implements and nuggets of copper in this vicinity.

The present owners of the ground, however, have contented themselves with merely scratching the surface in their endeavors to ascertain the extent and value of the deposit. Shallow trenches have been run, small pits sunk and short tunnels driven in the hillside.

ECONOMIC IMPORTANCE OF DEPOSIT UNQUESTIONABLE

Sampling done upon several occasions has given greatly varying results, the general average of the ore having been returned by different engineers as low as 2.5 and as high as 7 per cent. However, the economic value of a deposit of this nature cannot be determined by results of a few samples, taken from leached outcrops, and a systematic testing of the beds by means of drill holes or pits will have to be concluded before an attempt is made to estimate the quantity and quality of the ore-bearing strata. On the other hand, a mere superficial examination of the ground discloses ample evidence of the existence of millions of tons of workable ore.

One ton of roughly sorted ore, broken from the outcrop, was shipped to London for testing purposes. This ore assayed 12.8 per cent. copper and lent

Smelting at the mine would not be advisable at present on account of the



SANDSTONE AND CONGLOMERATE CARRYING 10 PER CENT. COPPER, CARANGAS, BOLIVIA

consumption but exports sheep, vegetables, poultry, grain, fodder and beans. The Indian laborer requires nothing else and these supplies are both cheap and abundant.

ELEVATION 12,000 FT. BUT CLIMATE IS NOTABLY HEALTHFUL

The climate of the Bolivian plateau at an elevation of 12,000 ft. is notably healthy and imposes hardship upon neither foreigner nor native. Fully 75 per cent. of the Bolivian tin and silver mines are located in the mountains from 2000 to 4000 ft. higher than the plateau and operations proceed without inconvenience or injury to the health of employees or miners. At Carangas there are only two seasons of the year, the wet from November to February and the dry from March to October.

Considering the promising nature of the deposit and the existing favorable conditions for its working, it seems probable that with the completion of the Arica-La Paz Railway, mining operations upon an extensive scale will be instituted here, and that the entire district will be thoroughly prospected in search for further copper-bearing beds in the sandstone hills.



TYPICAL SCENES IN THE CARANGAS DISTRICT—AYMARA INDIANS, THE PRINCIPAL LABOR SUPPLY

itself readily to treatment by concentration and leaching, a high percentage of extraction being obtained.

MILLING, CONCENTRATION AND LEACHING OF TAILINGS ADVISABLE

The method of treating the ore at the mine, which first suggests itself, would be milling and concentration up to about 70 per cent. The concentrates would be shipped and residue of copper in tailing would be recovered by leaching Sulphur, for the manufacture of acid for this purpose, could be obtained from deposits near the summits of one of the volcanic peaks in the neighborhood. An abundance of water for concentration purposes is to be had from the nearby Rio Turco, while if desired, upward of 2000 h.p. could be obtained by installing a hydroelectric plant on the Coribiri river, 25 miles to the west of Carangas.

high cost of imported fuel; the plains, however, support a heavy growth of greasewood, which would furnish ample fuel for ordinary steam-plant purposes.

NATIVE LABOR SUPPLY SUFFICIENT AND SATISFACTORY

No foreign labor would be required in working the property, since the native population would supply sufficient for all purposes. The Bolivian Indian, although primarily a farmer and shepherd, has been a miner for generations and not only works the mines of his own country, but emigrates to Chile, where he is admittedly an important factor in the mining and nitrate industries. While his efficiency is but about one-half that of a white miner, his wage is more than correspondingly low.

The surrounding country is purely agricultural and pastoral and not only provides food supplies for domestic

COPPER PRODUCED AND PLACED ON SHIP FOR 11c. PER LB. IN CORO CORO DISTRICT

At the present time the nearest mines are those of the Coro Coro district, 90 miles to the north, where copper ore occurring in a similar formation has been successfully worked for the past 40 years, the annual output being about 2500 tons of fine copper.

These mines are down 1600 ft., upon 4 per cent. ore which is concentrated up to about 70 per cent., the concentrates being shipped by wagon 50 miles to Viachi and thence by lake steamer and rail 550 miles, to the Peruvian port of Mollendo. The total cost per pound of copper, placed on board ship, amounts to 11c. From 1880 to date this field has produced 185,000,000 lb. of copper. The ore occurrence is identical with that at Carangas.

CARANGAS DEPOSITS WILL BE VALUABLE UPON COMPLETION OF RAILROAD

The Carangas deposits, after having been deserted by the Indians, remained forgotten for generations and it was but a few years ago that sheep buyers from Oruro noticed that the Indian shepherds were building the fences of their corrals from bright-colored copper ore. This led to investigation and upon the discovery of the outcrops the properties were taken up. A German mining engineer visiting Oruro, heard of the find, and after examining the deposit, bought out the native owners.

The isolated situation accounts for the fact that the deposit so long remained unknown. That the field now promises to become one of considerable importance cannot be doubted. The nature of the formation, resembling as it does, that of Coro Coro, promises a continuance of ore in depth. The presence of a bountiful supply of labor, water, fuel and sustenance favors low working costs. The extent of the property is greater than that of the workable Coro Coro area, and the outcrops are more numerous and of greater strength than there. The one great drawback, lack of transportation, will be remedied in 1911 when trains run over the Arica-La Paz Railway.

Reminiscences of Early Mexican Experiences

BY GEORGE W. MAYNARD*

On my return from Colorado in 1868 I was asked by Samuel L. Barlow, the eminent New York lawyer of that day, if I would go to Mexico to make a mine examination, to which I assented. Terms and time for starting were agreed to. As I was leaving his office he asked me if I knew anything about the Bartola gold process? As a plant had been installed in Central City before I left Colorado I was able to tell him that "the process was a fake!" He made no response to my criticism, but on my return to his office, on the day appointed for the final arrangements before leaving for Mexico, Mr. Barlow's secretary informed me that Mr. Barlow had concluded not to retain me because I had condemned the Bartola process in which he had a large pecuniary interest and which he intended to adopt at the mine he wanted examined in Mexico. The man who went in my place was killed by Apaches on the Arizona-Mexico border so I have attributed the prolongation of my life to my knowledge of the Bartola process.

Those who have never heard of the process may be interested to know what Doctor Raymond said about it in his 1870

*Mining engineer, 20 Nassau street, New York.

report to the Government on "Mines and Mining:"

ANOTHER SECRET PROCESS

"It is difficult to reconcile the history of the Bartola process with the hypothesis of honesty on the part of the inventor. The secrecy with which its manipulations were conducted, and the readiness with which, after failure in one place, it was revived with the same splendid promises in another, and the immense prices exacted for its use, in advance of all practical success, were not the usual signs of a sincerely proposed improvement in metallurgy. The process consisted in an exposure of the ore in vats to the disintegrating action of various chemical agents, among which, at one time, were steam and pyroligneous acid, from the distillation of green wood, and subsequent treatment by amalgamation in small pans."

The Bartola mill was built in the gulch between Central City and Black Hawk and the work was carried on behind locked doors. I once managed to slip in and found that "pyroligneous acid" was being generated by passing steam through pine branches. *Mirabile dictu!* The patent-process man could always get a hearing and capital and as Raymond facetiously expressed it. "Colorado was covered with outcrops of worthless gold-saving machinery."

This is a rather long explanation of how I didn't go to Mexico. In September, 1879, I went to Arizona for the first time and put in two months examining many mining properties with General Fremont, at that time Governor of the territory. Before the completion of my work Professor Newberry telegraphed me to go to Sonora, Mexico, for some of his clients and that Emmet R. Olcott, a New York lawyer, would meet me at some point in Arizona and go with me. Through some misunderstanding Olcott reached Yuma fully a month before I could start. Imagine if you can a month in Yuma and the temperature of the almost daily telegrams I was getting from him.

We finally met at Adonde, a water tank about 50 miles east of Yuma. It was with considerable trepidation that I got out of the train for I had fully expected a warlike demonstration. At first he did make remarks, and then expressed gratitude that I had at last arrived. Our outfit consisted of a two-seated covered spring wagon, and a single-seated buggy. Our food supplies, small barrels of water and cooking utensils were carried in the double wagon in which we rode.

CHARACTER OF THE GUIDES

The two men who were our guides and who had the option on the property we were to examine drove ahead in the buggy. We subsequently learned that

one of the men, a Jew, had been with the Mormons when they attacked the emigrant trains at Mountain Meadow in Utah, and his companion had murdered a man somewhere east and had escaped to Yuma. In those days Yuma was a veritable "Botany Bay." Our driver was a most original character and had prospected from Mexico into British Columbia and all the intermediate country. His experiences and unconscious wit did much toward enlivening our journey.

ELEVATED WATER BASINS

Our first camp was at the foot of a low range at a point called Tinacos Altos (high tanks), so called because during the rainy season water collected in natural basins in the limestone. Some years previous to our trip a party which had been many days without water camped at the foot of the mountain and although they were within a few hundred feet of the water were ignorant of it and all died of thirst. On our five-day drive there was but one well where the water was drinkable for the horses. Into another shallow well a variety of animals had fallen.

WEATHER HOT BUT QUAIL PLENTIFUL

The temperature during the day ranged from 105 to 115 deg., so we broke camp before daylight, and camped in the shade of our wagons from noon until 4 to 5 p.m., and then traveled well into the night. We did not lack for fresh meat for the quail were plentiful and Olcott was an expert with the shotgun and the frying pan, so that quail on toast, soda crackers, and omelettes, as long as the eggs lasted, were our standby three times in the 24 hours.

MINES VALUELESS

Our objective point was Sonoita in Mexico, just over the line. It did not take long to find out that the mines were valueless and we probably did not try to conceal the fact that we so regarded them, for on our return to camp early one evening, the promoters not having returned, the storekeeper warned us to hitch up and light out and drive all night as he had overheard our traveling companions say that we would not get out alive unless I promised to make a favorable report. We took his advice and drove all that night and after resting the team for a few hours the next morning pushed on and finally overtook a big wagon train and camped with them. The evening of the following day the precious pair drove into camp and of course expressed surprise that we should have left so soon, to which we responded that we had completed our investigations. We traveled with the train until we reached the railroad. I subsequently learned that it would not conduce to my health to visit Yuma.

Mining Methods Employed at Cananea, Mex.—I

The Old Square-Set System Replaced by Cheaper Methods. Geological Conditions Favor Slicing and Caving; Less Timber Required and Safer

BY MORRIS J. ELSING*

It is the object of these articles to describe the most important methods of mining at Cananea, for Cananea is a camp of mining methods. Under the leadership of Doctor Ricketts every foreman at the Cananea Consolidated Copper Company's mines is constantly on the lookout for some new and cheaper method of mining, or the introduction of some new feature by which he can reduce the costs per ton. Failures have been made with some of the new methods, but they are insignificant in comparison with the successes. Six different methods will be described which may be classified as opencut mining, square setting, top slicing, caving, pyramid and back stoping.

To fully appreciate the low costs obtained by these methods of mining it is well to understand some of the general conditions which tend to produce them. As a rule nearly everything is favorable to efficient and cheap methods of mining. For example, the mines are comparatively dry, the ventilation is good and there are few stopes that are even warm. The ore being near the surface makes it possible to handle a large amount through adits. Deep mining is not yet necessary. On the whole labor conditions are good, while the geological features, which are the most important factors in the permitting of cheap methods of mining, are most favorable.

LABOR CONDITIONS

The largest part of the labor employed at Cananea is Mexican. A few Chinamen are employed on the surface, especially at Puertocitos in the opencut. The foremen, bosses, timekeepers and a few others are Americans. The Mexican labor is both good and bad. There are those among them who are excellent workers, good machinemen and steady miners. As a rule they are fine ore sorters, much of which work has to be done. The average Mexican cannot stand prosperity. That is, he will often work three or four days, by which time he will have had enough of work, and the next day when wanted he cannot be found. The uncertainty of the Mexican is so great that the company pays a premium of 0.25 peso per shift, provided that he works 26 shifts during the month. The premium system is quite successful. The Chinese labor is good. The Chinaman is a steady, faithful workman. In the opencut at Puertocitos the Chinamen are becoming

good drillers and miners, and they can be depended upon to such an extent that they do not receive the premium for working regularly.

The scale of wages for Mexican labor per shift is as follows: Miners, 3 pesos; machinemen, 3.75 pesos; helper, 3.25 pesos; timberman, 4.50 pesos; repairmen, 3.50 pesos; muckers and carmen, 2.75 pesos. This does not include the premium. The Chinaman receive 2.50 pesos for all work.

FAVORABLE GEOLOGICAL CONDITIONS

The geological conditions are favorable for cheap mining. The ore is low grade but it can be easily mined; and although it has a comparatively low concentration

mined in benches with a vertical height of 80 to 100 ft. At present there are three of these benches one directly above the other.

METHOD OF BREAKING THE ORE

The first breaking of the ore is done by means of long holes drilled along the top of the benches. The drillers work in pairs, the first nine or 10 ft. being drilled with hammers, while the remainder of the hole is churned down to a depth of 22 to 24 ft. The length of the time of drilling varies greatly. It usually takes from two to four days for each long hole depending entirely on the character of the rock. The hole is then sprung with several charges of dynamite, while for the



OPENCUT MINING AT PUERTOCITOS

ratio it is practicable to mine an average of 2.8 per cent. copper ore which is concentrated. The ore and the waste are usually quite definitely defined, and where it is necessary to sort the waste from the ore, the class is such that the waste can be easily distinguished from the ore. The formations in several of the mines, both the ore and the waste, are such that they stand well. The walls and the pillars of ore are of such a nature that in some of the mines little or no timber is needed to support the roof.

I—OPENCUT MINING AT PUERTOCITOS

At Puertocitos the ore occurs on the surface in highly metamorphosed limestone. The copper minerals are numerous including almost all the common oxides and sulphides. The gangue minerals, besides limestone consist principally of quartz and garnet. The ore is

final blasting the hole is loaded with five or six 50-lb. kegs of black powder and fired with an electric battery. Often five or six of these holes are fired at once, breaking a large tonnage of ore. The object is to displace the rock and shatter it but not throw it to any distance.

The cost of shooting these first large holes is comparatively small. The largest item of cost consists in shooting plugs and "plasters" afterward. This blasting is done four times a day, in the morning at 8:30 and 12, and in the afternoon at 2:30 and 5 o'clock. At these times a red flag may be seen flying from a pole in a prominent place warning all that it is blasting time. A half-hour before this time a powderman and his helper prepare the blasts. The powderman places from one-half to a stick and one-half of dynamite, with a 3-ft. 6-in. fuse attached, on the boulders which are too

*Mining engineer, Bisbee, Ariz.

large to break with a hammer. The helper places a small shovel full of wet clay over the powder to hold it in place on the boulder. Large boulders are plugged and blasted at the same time. At a signal from the central bench all the fuses are spit together.

The ore contains considerable waste and so has to be broken small enough to permit sorting but not so small as to produce fines as these cannot be sorted. With the shooting of these "plasters" the men can sledge and break up the fragments so as to get a fairly good separation of waste and ore.

GENERAL ARRANGEMENT OF BENCH AND METHOD OF HANDLING ORE

The main haulage line over which the waste and ore are trammed is usually near the edge of the bench running parallel to the working face with switches and turn-sheets running from the main line perpendicular to the working face. The accompanying halftone engraving, shows the method of working. Each bench is

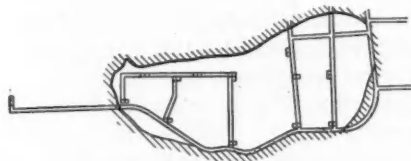


FIG. 1. Sub Level Prospect Drifts and Raises.

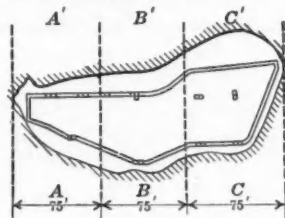


FIG. 2. Development Drifts.
The Engineering & Mining Journal

PLAN OF SLICING SYSTEM AT CANANEA

in charge of a foreman who directs the arrangements of holes, and watches the sorting of the ore. The handling of the waste and the ore is an important question. The waste is trammed several hundred feet to a small ravine where there is a large dump being used by three benches one above the other. The question of handling the ore is a more difficult one. The ore from the first or lowest bench is dumped down a raise placed in a barren part of the hillside to one side of the cut. A tunnel at the same elevation as the railroad ore bins connects with this raise. The ore is trammed direct to the bins from the chutes. The ore from the second bench is loaded directly into a small bin from which a gravity tram runs to the main bins. The handling of ore from the highest bench is still more difficult and is accomplished by means of a raise and tunnel to the second bench and then down to the main ore bins by means of the gravity tram.

SAMPLING

Very little sampling is done at the mine. Every day each foreman is allowed to take two 3- or 4-lb. samples. Any attempt to take a fair average sample would be useless as well as almost impossible. The sample is more a deliberately picked sample than an attempt at an average. If at any one part of the bench there is ore that is a little bit doubtful he will sample that. Again, he may take a sample of what looks too low or perhaps he may sample some of the high-grade ore. In this way it is possible to get a fair idea of what the general average of the ore is, the ore being finally sampled at the Cananea sampling works.

COST

The cost per ton of ore is high for opencut work, due to the great amount of waste that it is necessary to handle. The output per man per shift, including tool nippers, muckers, bosses and all men working at the mine is approximately nine ½-ton cars of ore and waste. The ratio of the number of cars of ore and waste varies considerably. Approximately one-fourth to one-fifth of the material handled is ore which runs 4 per cent. and better. That is, roughly one ton of ore per man is mined while the cost for powder is about 20c. per ton of ore.

Considerable waste is being used by the railroad in filling gullies (now trestled), which will eventually reduce the cost of railroad maintenance. The greater part of the waste is in two large dumps convenient to the railroad tracks. One cannot help wondering whether these dumps will not be mined some day when a leaching process has been discovered for this class of rock which contains between one and two per cent. of copper.

II—SQUARE-SET MINING

The days of square-set mining at Cananea are past. It has been replaced by modern methods of cheap mining and it is to these primarily that Cananea owes its greatness. Perhaps not over 5 per cent. of the output at Cananea is ore from the old-type square-set stope. However, its importance is great because it has two important functions: (1) It is a necessary auxiliary to the other systems of mining as it is used in conjunction with slicing and the different caving and back-stopping methods. (2) It can always be depended upon to work in any kind of ground where other methods have failed. It is the one sure, unailing method, the last resource. It is used at the Kirk mine where a narrow vein of ore is being stoped. As employed it does not vary much from the system followed at the Copper Queen in Bisbee, with the exception that little refinement in the

framing and fitting of timbers is necessary. As the ground is not heavy, stopes are usually quite large, containing sometimes 200 to 300 sets on each floor.

THE FRAMING OF TIMBERS

Sill posts have a flat bottom and are 8 ft. 5 in. over all, making 8 ft. in the clear. The horn on each end of the post is 5x5x5 in. long, placed in the center. Caps and ties are 4 ft. 7 in. long with a tenon 5x10x1½ in. long making posts 5 ft. center to center capway and tieaway. Posts and caps are 10x10-in. timbers, while the ties are 8x10 in. unframed. Posts on all floors except the sill are 7 ft. 4 in. over all, giving 6 ft. 6 in. in the clear. Little special framing is necessary and what little there is can be done by hand. Most of the framing is done at a central sawmill for all the mines and then distributed to each mine. Where square sets are used there is usually a small stock pile kept on every level, thus making it unnecessary to send on top for timber. All the chute lining is 3-in. plank placed vertically. A small steel arc chute gate is usually used.

COST OF SQUARE-SET MINING

The cost of mining by the square-set system is necessarily high. On an average, 27 to 31 board feet of timber are used per ton of ore mined. The timber is usually a good grade and costs considerably more than the timber used in slicing. In addition to the cost of timber, mining cannot be carried on as efficiently where square sets are used because of the danger of breaking timbers with large charges of dynamite in a more or less confined space. Again, there must be added the cost of framing, setting and blocking the timbers, which is a large item. The cost of mining, including timber, will probably average from \$1.20 to \$1.40 per ton for ore delivered to the chutes. The excellent practice of charging all prospect and development work directly to the ore is followed at Cananea. In order, however, to put the cost of square setting on a basis for comparisons with the other methods, the cost of mining and timbering alone are considered.

III—THE SLICING SYSTEM

The majority of the orebodies at Cananea are mined by the slicing system. Approximately 65 per cent. of the total output comes from orebodies at the Veta Grande, Oversight, Capote and America mines where this system can be employed to advantage. This ore is usually chalcocite disseminated through a soft decomposed kaolinized porphyry, easily broken and well adapted to the requirements of the slicing system.

GENERAL METHOD OF ATTACK

Figs. 1 and 2 are sketches of the actual method of procedure that was followed in mining an orebody at the Over-

sight mine. Before actual stoping operations begin the orebody is thoroughly prospected by means of raises and intermediate drifts. Fig. 1 shows a number of prospect drifts run to explore the orebody and also the arrangement of the raises to further prospect and to facilitate mining it later on. These intermediate prospect drifts may be run at 35 and 70 ft. above the level where the levels are 100 ft. apart. These drifts always more or less outline the ore, indicating the general plan to be followed for the subsequent mining.

SQUARE SETTING COMBINED WITH SLICING

When the working drifts are opened the top of the orebody is usually mined by means of square sets. The object in this is that often the upper portion of the body is irregular and square setting is the best method applicable for mining these undefined ore masses found above the main part of the body. After the upper portion has been square set the floor of the stope is covered with 2-in. plank resting on 5x10-in. sills 10 ft. long. If possible before slicing begins, the square sets are removed and the back is caved on the plank floor. In this case considerable timber can be saved, while if the square sets cannot be removed they may be gobbled in order to form a pad or mattress above the slice. Again, if the top of the orebody were more or less regular it might be possible to mine it out by using stulls and head boards to support the roof and then the plank floor would be put down as before. At all events, the condition desired would be to make the waste roof cave upon a plank flooring.

METHOD OF SLICING

A slice 11 ft. thick and from 50 to 75 ft. wide is carried across the orebody from one wall to the other and is usually started at the end of the orebody, as shown in Fig. 2. Here the slice was carried across the body from A to A', approximately 75 ft. wide. Subsequent sections were mined from B and C to B' and C'.

There are several methods of starting a slice. Fig. 2 shows small intermediate drifts which are run at the bottom of each 11-ft. slice. These drifts are usually not over 6 ft. high. They serve principally as a means for commencing the slice and as an entrance and exit to the working face. When one slice is sufficiently far advanced the drifts are run in the slice below.

The slice is sometimes commenced from a raise near the edge of the ore by mining out a drift 10 ft. wide and with a height equal to that of the slice and perhaps 30 ft. long connecting with another raise. The section is now thoroughly opened and it is possible to work a full force of men on the new slice as soon as the one above has been finished.

In this way the output is kept as nearly constant as possible.

In the actual operation of mining the sills of the slice above, with the plank flooring resting on them, are caught up on stulls. The nature of the ground varies considerably. There is much ground where picking is possible and auger holes are used entirely, while there is some ore so hard that a 2½-in piston drill is necessary.

TIMBERING TO SUPPORT ROOF

The stulls are from 6 to 10 in. in diameter, while the sills are 5x10-in. timbers, 10 ft. long. Sills were not formerly used with the plank flooring. The sills add only a small amount of extra timber as formerly the planking had to be

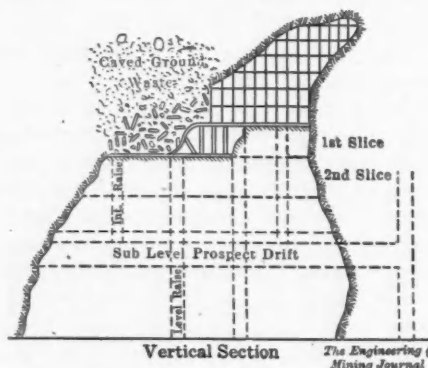


FIG. 3. SLICING SYSTEM AT CANANEA

lapped. The great advantage is that it facilitates catching up the roof by means of the stulls and this extra expenditure for timber is offset by cheaper labor costs.

Stringers are placed 5 ft. apart, parallel to the working face, and the stulls from 5 to 10 ft., depending upon the weight of the ground. The stulls are not placed upon the plank flooring as the post is usually driven down by the weight of the roof above, which would not only break the plank, but also raise the floor. Therefore it is necessary to cut the plank to fit around the stulls. When sorting is necessary, the waste is thrown back on the floor.

NUMBER AND POSITION OF RAISES

The matter of placing raises is quite important. With the intermediate drifts described it is possible to use intermediate raises, making the intermediate prospect drifts a sublevel and running the ore to two or three main-level chutes. Again, with these sub-levels run a little way out into the waste wall all timber could be lowered from the level above to the sub-level and hoisted a short distance to the slice that was working. The most desirable location for raises would be from 25 to 35 ft. apart all over the slice. For in this case it would be possible for the miner to shovel directly into the chutes. In actual practice this cannot always be done and the wheelbar-

row becomes a necessity. When the slice has advanced 30 or 40 ft. it is then time to drop the roof. This is accomplished by boring a hole 4 in. deep in each stull, with an air-driven auger, and blasting it with a piece of a stick of powder. A gangway about 5 ft. from the breast is left, which is lagged off and the rest is caved. It is possible to have several slices working at the same time, in steps so to speak. The distance permitted between these slices depends entirely upon the weight of the ground.

Square setting is again used as an auxiliary to slicing in the mining of irregular stringers and shoots of ore on the edge of the body where slicing cannot be carried on.

SAVING TIMBER

Practice at Cananea has proved that it is not profitable to attempt to save stulls. This is partly due to the fact that these timbers are of an inferior grade and therefore cheap. There is another prevalent idea that after a large mat has collected above the ore it is possible to drop the roof directly upon the ore without first putting down a plank floor. Practice here again shows that any attempt to economize in plank flooring is not warranted and actually increases the cost of mining.

Despite the fact that no stulls are saved and that a plank floor is used for every slice, only 10 to 11 board feet of timber per ton of ore is used. This

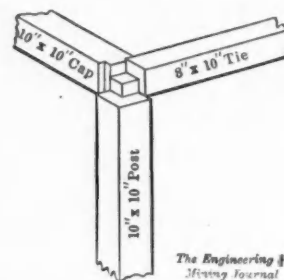


FIG. 4. CANANEA METHOD OF FRAMING SQUARE-SET TIMBERS

figure is from large averages of timber used and is much lower than some of the other Southwestern copper camps where slicing is employed. In Morenci, for instance, the board feet per ton of ore is practically as large as by the square-set method of mining.

COST OF SLICING

Slicing is a cheap system of mining and the results at Cananea are especially good. Including timber and labor charges in delivering the ore to the chutes, the cost seldom exceeds 60c. per ton. The averages show considerably lower costs, but when certain allowances for square setting and other details which are usually attendant, are made, these figures are conservative.

REQUIREMENTS OF VARIOUS METHODS

The requirements for the opencut method of mining need hardly be discussed, as they depend only upon there being a sufficiently large surface exposure of a grade of ore that will pay something more than the bare cost of mining and beneficiating.

The requirements of the slicing system are several: (1) The condition of the back must be such that after it is broken it will follow down evenly over the whole slice after the stulls have been shot away. (2) The orebody must have more or less definite boundaries. Irregularities are a disadvantage to the most efficient working of the system, as they must be mined by means of square sets. (3) The ore must be fairly homogeneous. It may contain considerable waste which can be sorted underground in the stope, but the ore cannot pinch and swell and contain rich ore separated by layers and irregular masses of waste.

Of all the methods of mining described, square setting has the most advantages, but balanced against these is the one disadvantage of high cost. Besides the other general advantages of this system, at Cananea the most important are: (1) Its adaptability to mining small irregular bodies of high-grade ore in soft, decomposed ground. (2) Its adaptability to mining irregular offshoots and stringers from orebodies where some cheaper method cannot be employed. That is, its usefulness as an auxiliary to other methods is of great value. (3) Its adaptability to mining ground where other methods have been tried and failed. It is the one "only reliable method," the grade of the ore being the only thing which limits its use.

CONCLUSION

The slicing system is well adapted to the conditions at Cananea. It has the great advantage of being a cheap method and its requirements are not so rigid as to make its use rare. The method is said to be even safer than the square-set system, but on the other hand, the ventilation cannot be kept as good.

In the slicing system we have the most important method of mining in Cananea. It does not produce ore quite as cheaply as the pillar-caving system, which will be described later, but it can be much more easily adapted to the general conditions met in copper mining.

Heavy Roll Shells

The Inter-Ocean Steel Company has lately rolled, at Chicago Heights, Ill., what are claimed to be the heaviest steel roll shells ever made. These are 5 in. thick, and have 20-in. face, the internal diameter being 44 in., and the external 54 in. These shells are weldless, being rolled from solid steel ingots, and weigh a little over 4400 lb. each.

Labor Conditions in Mining

WASHINGTON CORRESPONDENCE

The Immigration Commission, which issued some time ago a special report on bituminous-coal mining with particular reference to the condition of immigrant labor employed in that industry, has completed a series of additional reports dealing with anthracite-coal mining, bituminous-coal mining on the Pacific Coast, metalliferous mining and smelting, iron-ore mining, and the steel and iron manufactures. The reports will shortly be issued for distribution. It has not been generally known that the commission had gone so fully into the conditions existing in the metal trades and in mining; but the combined results of the investigations make the most extensive inquiries into the subject the Government has ever prepared. As in the case of the coal report already made public, stress has been placed upon labor conditions and rates of wages, as well upon the racial composition of the working forces.

The reports include elaborate reviews of the growth of the various branches of industry, the conditions affecting their development, the policy of employers in hiring immigrant labor and other matters of the same kind. These reports will probably be approved by the Immigration Commission at its next meeting, and ordered to be issued to the public.

Alaska Boundary Survey

VICTORIA CORRESPONDENCE

The survey work in connection with the delimitation of the international boundary line between Alaska and northwestern Canada, which has been in progress for years, is gradually approaching completion. Part of the Canada boundary survey party, in charge of Frederick Lambert, of Ottawa, Ontario, who has as his chief assistant A. J. Rainboth, also of Ottawa, has gone south, *en route* to Ottawa, having concluded the season's field work. The United States Government has been represented on this work by D. W. Eaton.

The survey party of 22 men spent the summer in the vicinity of Ledoux creek, 70 miles from the mouth of White river, a tributary of Yukon river which it enters in Canadian territory. They worked southward, toward Mount St. Elias, in a region that is comparatively level, so fair progress was made in clearing the right-of-way through wooded stretches of the country and marking the boundary line by monuments. The following review of the work and its progress is by a member of the Canadian survey party.

"Already the International Boundary

line between British Columbia and Alaska, from Portland canal to Mount St. Elias, has been practically determined. The boundary between Yukon Territory and Alaska, from Mount St. Elias north, follows the 141st meridian to the Arctic ocean, and traverses for the greater length of its 600 miles a virgin country, parts of which are unapproachable. Thus, the unbroken wilderness of snow and ice throughout the St. Elias ranges has never yet been crossed by man, and for its survey an airship is needed.

MUCH OF THE WORK COMPLETED DURING THE LAST SEASON

"The boundary line north of the mountains and up to the Porcupine river was practically finished last summer, and only the survey northward to the arctic ocean remains to be done. In the section of the country between the middle White river and the head of the Chisana-Tanana and the Porcupine river there were in the field, during the season just closed, several Canadian and United States survey parties. Of these, Douglas H. Nelles has about finished geodetic levels between Whitehorse, in southern Yukon, and Dawson, which work has occupied several years. Chief Lambert's party, with Thomas P. Reilly, has practically completed the survey south of the Yukon and Porcupine. William B. Gilmore is preparing a base for next year's operations, where the boundary line is cut by the Porcupine river.

MARKING BOUNDARY

"The boundary line is marked in three ways, namely, by monuments, by cutting out the vista, and by ascertaining the exact line at all points such as the banks of rivers, the crossing of trails, and the summits or ridges of mountains. The monuments are placed along the spurs on the line. These monuments are of aluminum bronze, and two sizes are used; for the more important points, a large size, five feet high and tapering toward the top, and weighing about 275 lb., is set in a base 250 to 3500 lb. in weight. For the minor or less accessible points a more portable monument is used, this weighing about 55 lb. It is of similar material to the large ones, but is a hollow cone, three feet high, with four legs of cement set in holes drilled in solid rock or in a bed of concrete.

"A 20-ft. sky line is cut through all timber along the line. Accurate maps are made, these showing the topography for two miles on each side of the line. The latitude, longitude and altitude of all permanent points along the line, also of all monuments, are ascertained and duly recorded. Transportation is the most difficult problem of the work, which is done by joint parties of Americans and Canadians, the cost of the operations being divided between the governments of the two countries."

The Drop Shaft Method of Sinking

Details of System of Shaft Sinking Where Strong Flow of Water Is Encountered. Hydraulic Pressure Used to Push the Tubbing Down

SPECIAL CORRESPONDENCE

In a paper read before the Manchester Geological and Mining Society, Messrs. C. Oilkington and P. L. Wood describe the sinking of the Astley Green shafts at Astley, Manchester, by means of the drop-shaft method and underhanging tubbing.

This coalfield is about 700 Cheshire acres in extent, it is bounded on the northern side by the Astley and Tyldesley Company's coalfield, and extends to the south beyond the Manchester and Liverpool railway on Chat Moss. The seams, which dip to the south at the rate of about 1 in 5, comprise the complete series from the Worsley Four-ft. seam down to the Arley seam. The surface is covered at varying depths with drift, marls and sandstones; the last named being heavily watered, it was necessary that the shafts should be sunk as far as possible on the rise, in order that the water might be tubbed back.

BOREHOLES SHOWED MUCH WATER

A borehole put down in 1899 about three-quarters of a mile south of the pits now being sunk, proved that the difficulties would be so great that the scheme was abandoned, and to this day, a large volume of water gushes up freely from the bore hole above the surface of the land. The present owners, in 1907 put down a borehole 24 in. in diameter, in the hope that it might be used for pumping to lessen the water in the shaft, but it proved only a source of expense, anxiety and delay.

The drift proved to be 99 ft. 4 in. thick, and the marl and sandstone 310 ft. 7 in. thick and freely watered. Fortunately the first 30 ft. from the surface consisted of strong clay, but practically the whole of the remainder of the drift was troublesome ground, consisting of layers and pockets of sand, gravel, and marl with glacial boulders.

HEAVY MASONRY NECESSARY WITH DROP-SHAFT SYSTEM

After very careful consideration it was decided to adopt the drop-shaft system as the best means of getting through the drift. With this system it is extremely important to have an adequate weight of masonry at the surface for providing resistance to the enormous hydraulic pressure, which it is necessary to use in order to push the tubbing down. The authors described an arrangement for securing this resistance, which so far as they know, is the first of its kind, and is their own design.

A temporary wooden ring was first laid on the surface clay, the center of the ring being the center of the shaft. In this ring, 26 equidistant holes were bored at a radius of 13 ft. 9 in. from the center, and upon it a circular ring of 9-in. brickwork, with an inside radius of 12 ft. 5½ in., was built 5 ft. high to the same center. On the top of this brickwork another wooden ring similar to the first one was fastened, with the holes in the two rings exactly plumb. Bolts, 1½

in. diameter were temporarily held in position by the two wooden rings. The concrete being only 3½ ft. thick, another short wall was built up around the outside of the 5 ft. of brickwork, inclosing the bolts in solid masonry, after which the top wooden ring was removed, and a cast-iron ring, having holes through which the short bolts protruded, was inserted. These bolts were screwed at each end for 3 in., the screw portion sticking up above the ring. Sleeve nuts 5 in. long were screwed on to the top

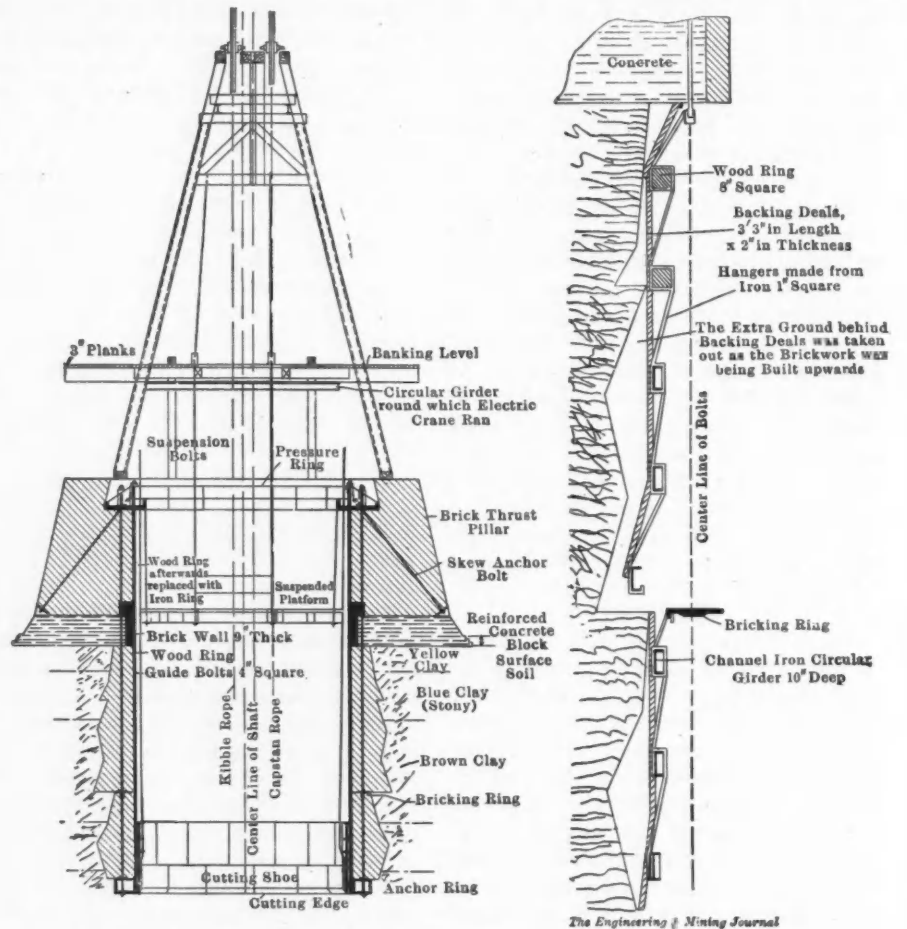


FIG. 1. SECTION OF HEADGEAR AND TOP OF SHAFT

FIG. 2. SHOWING METHOD OF SINKING DOWN TO ANCHOR RING

in. in diameter and 6 ft. 5/8 in. long, and screwed at each end, were then placed through the holes and pushed 9 in. into the clay. A large hexagonal and strongly reinforced concrete block measuring about 50 ft. across, was then laid around the outside of this brickwork. This concrete block was a very important feature of the sinking.

METHOD OF BUILDING UP THE CONCRETE

As the concrete was built up, it inclosed around the short bolts which were tem-

porarily held in position by the two wooden rings. The concrete being only 3½ ft. thick, another short wall was built up around the outside of the 5 ft. of brickwork, inclosing the bolts in solid masonry, after which the top wooden ring was removed, and a cast-iron ring, having holes through which the short bolts protruded, was inserted. These bolts were screwed at each end for 3 in., the screw portion sticking up above the ring. Sleeve nuts 5 in. long were screwed on to the top

of the bolts so the latter could be lengthened later. In building up the brick thrust-pillar, additional holding-down bolts were built in on the skew from the pressure ring to the outside of the pillar. This was an innovation of the authors which subsequent events proved to be of great value. In order to place these skew anchor bolts in position after the pressure ring was fixed, it is obvious that the whole of the brickwork would not be built at once of the required width.

HYDRAULIC JACKS USED UNDERNEATH THE PRESSURE RING

When the tubbing had been built in the shaft to within 6 ft. of the pressure ring, twelve hydraulic jacks were placed underneath the pressure ring, and were suspended by strong bolts through holes provided in the casting. A special feature of the jacks was that by opening one tap and closing another, the water pressure would lift the pistons to the top of the stroke, which saved a great deal of labor, as the pistons were very heavy. The tubbing rings were each 4 ft. 11 1/16 in. in height; the hydraulic jacks, however, only had a stroke of 22 in., as they would have been much too cumbersome with a 5-ft. stroke. To get over this difficulty, two special cast-iron rings were made, each being one-third of the height of the standard rings. When the jacks had pressed a new ring of tubbing down 22 in., the pistons were raised back to the normal position, and one of the small rings of tubbing was temporarily bolted on to the last main ring of tubbing. This in its turn was pushed down, after which the second small ring of tubbing was inserted and pushed down as before. The pistons were again raised, the temporary rings taken off, and a permanent ring of tubbing placed in position. This process was again repeated, until the whole of the tubbing was pushed down to a total depth of 112 3/4 feet.

DROP-SHAFT METHOD BEST IN TREACHEROUS GROUND

Where the ground was treacherous, the authors said the drop-shaft method of sinking was of the greatest advantage, as the cutting shoe was always well below the shaft bottom, and at no time was trouble experienced from collapsing sides. A strange feature of this system was that although the tubbing itself was of enormous weight (being at the completion of the drop-shaft process 514 tons) in no case did it travel down without the aid of hydraulic pressure. Care was taken, however, that nothing that was hung in the shaft could foul it if it moved.

The water at times exceeded 15,000 gal. per hour, and was got out of the shaft by a number of Ellison pulsometers; however, great trouble was met with from the sand and small debris obstructing the pumps. When the shaft became too deep to pump to the surface in one lift, tanks were slung and the lift divided.

As Messrs. Oilkington and Wood in their paper recall, in pushing down tubbing, the only guide to keep it perpendicular is the distance between the anchor ring and the pressure ring. It is therefore, quite possible, especially in loose or inclined strata, that the tubbing may vary somewhat from the vertical. To provide for this in the Astley sinking in the drop-shaft portion, the tubbing had an internal diameter of 23 ft. The rest of the tubbing below has an internal diam-

eter of only 21 ft. On plumbing, the tubbing was found to be 3 3/8 in. out of the vertical so a special tubbing ring was made 11/16 in. deeper on one side than the other. Two conical reducing rings were then put in to bring the diameter to 21 ft., and they also provided a reliable support for the tubbing. The center of the bottom ring was then projected on to the doors at the surface, and now acts as the center line for the rest of the sinking, although of course, it is not the center of the upper part of the shaft.

GERMAN TUBBING CHEAPEST

The authors say it is interesting to compare the cost of the German and English tubbing. The former in the bottom section was 23/16 in. and the latter 2 1/4 in. thick. Although the cost per ton of the English tubbing was \$9.68 cheaper than the German tubbing for the thicknesses mentioned, the English tubbing cost \$135.24 per foot and the German tubbing \$126.66, that is \$8.58 per foot in favor of the German tubbing. This was largely owing to the fact that the Germans used no vertical flanges except those for bolting.

At a depth of 1110 ft. it is anticipated that about 90 ft. of water-bearing rock will be met with between the Worsley Four-ft. seam and the Buin seam, for at the Kermishaw Nook shaft, belonging to the Astley and Tyldesley Coal Company, Ltd., in sinking through that rock, a considerable quantity of water was met with. The authors hope that as this rock will be passed through at a much lower level, there will be less water to deal with. Whatever the quantity may be, however, they consider the depth too great for tubbing, and to deal with it, they will, therefore, put in a permanent pumping station. During the time of sinking if the amount justifies it, it is intended to put in an electrical centrifugal pump. After these water-bearing strata are passed, it is expected that the rest of the sinking will be dry, and that the Arley seam will be found at a depth of 3360 feet.

The accompanying figures show (1) section of headgear and top of shaft, (2) section showing method of sinking down to position of anchor ring.

Coal Deposits in Brazil

Quite recently, within the State of Pernambuco, was discovered what promises to be a most valuable coalfield. According to U. S. Consul Griffith, the area embraces about 22 square leagues, and is situated about 1000 ft. above the level of the sea. The first seam was encountered at a depth of 70 ft., underlying a formation of clay mixed with sand and coal fragments impregnated with sulphides. While the analysis shows the first seam exposed, to be of only fair quality, its richness increases as the

shaft deepens. The following analysis is from the expert reports: Carbon, 58.7; volatile matter, 18.8; ash, 20.5; moisture, 2. As this particular field is located so that the coal can be advantageously mined and transported, it will prove of great value in furnishing cheaper fuel to the existing factories and manufacturing concerns, as well as to those contemplated within the States of Pernambuco, Alagoas, Fergipe and Bahia.

Making Coke from a Non-coking Coal

SPECIAL CORRESPONDENCE

It is generally known that the slack of all semi-anthracite coals does not coke, but chokes the fire and prevents the air passing through the burning coals. Notwithstanding this fact, however, there have been attempts more or less successful to coke coals which are naturally non-coking. The anthracite coal of Wales has been successfully coked by the addition of 6 per cent. of pitch, giving a superior coke that brings a higher selling price than the coke of true coking coal.

A system of coking, known as the Thompson-Heskett process, is followed at the Bluff Colliery Coking Works, in the central district of Queensland, Australia. At this colliery, the coal is not a coking product, and it is interesting to observe that, by this system, and with the admixture of tar, molasses and residual oils, the resultant coke was found to be of high value. One thing is noticeable in this coke, however, and that is that the final product is granular rather than cellular, and is but slightly intersected by cracks.

THE COKING PLANT

The final coking plant as completed at the Bluff colliery, consists of a factory built of wood and cased in galvanized iron; this structure has three floors carrying the machinery and appliances for preparing the coal for the ovens. To the left of this main building is a low shed, covering a sloping cistern, which receives the slack from a hopper car, which leaves the main line and traverses a set of rails. The slack, by gravitation and automatic arrangement, passes on to a conveying belt, which feeds a mill that reduces the already small coal to a fine powder.

The ground coal, by a series of conveyers, is elevated to a hopper on the upper floor of the building. Immediately beneath this hopper is a circulating drum holding about 7 cwt. of coal, into which the added tar, etc., is pumped from a cistern below. This drum, with the conveyer, etc., is operated by belts. Twenty minutes' circulation of the drum thoroughly mixes the coal, tar, etc.; how-

ever, as it is apt to form balls in the drum, the mixture passes into a lower hopper, from whence, by what is intended to be automatic delivery, it passes into a pugging mill. The pugging occupies six to eight minutes, and the mixture is delivered on the floor ready for compression into blocks, which at present are pressed by hand labor. These blocks are of two sizes and shapes, and are arranged for the two different ovens in use.

DETAILS OF THE OVENS

One of the ovens is a longitudinal affair, being 24 ft. by 6 ft. 6 in. This oven is arched at the top, and is heated by fires and flues in the sides. Rails are laid in this oven 3 ft. 6 in. gage, and set in firebrick pedestals. The molds for the mixture are put on iron trolleys, 6 ft. 6 in. by 7 ft., on strong axles, and the tables of the trolleys, 2 ft. above the rails, are protected by firebricks and fireclay, channels being cut for the heat to pass under the molds. There are six blocks on each trolley, having been pressed into one big subdivided mold.

of transverse compartments, with fire-grate beneath and between, into which the heat is conveyed by port-holes, right and left, and into flues rising into the combustion chamber, which extends along the whole length and breadth of the oven, and is covered by a flat arch. The sides of these vertical flues are perforated to allow the heat to get to the coke. Two or more of the flues are downcast and are conducted into the chimney for escape gases. The bottoms of these ovens, which are 7 ft. by 2 ft. 6 in. wide, slope from one end to the other, having a fall of 1 ft.; iron rods are embedded in the upper course of the floor, to facilitate the ingoing and egress of the molds. The doors of these ovens, back and front, are simultaneously opened and shut by means of a traveling windlass.

ANALYSIS OF BLUFF COAL

The coal at Bluff mine shows the following composition: Moisture, 1.4; volatile matter, 8.4; fixed carbon, 79.4; ash, 10.8 per cent. An analysis of coke made from Bluff coal shows the following:

have been determined on. The first will be at Birmingham, Ala.; the second at Huntington, W. Va.; and the third at Wilkes-Barre, Penn. The Wilkes-Barre station will cover the anthracite field. Other stations will be established throughout the country as soon as the plans are prepared, and the best locations decided on.

Anthracite Coal on the Pacific Coast

SPECIAL CORRESPONDENCE

Announcement has been made to the effect that the General Land Office has issued a patent covering 640 acres of anthracite coal land situated in the Mt. Baker district, Whatcom county, Washington. The anthracite coal deposits in this district were visited last July by Prof. Milnor Roberts, dean of the Washington State School of Mines, at Seattle. Professor Roberts has given the following information relative to this deposit.



FIG. 1. DISCOVERY TUNNEL OF THE ANTHRACITE FIELD IN MT. BAKER DISTRICT



FIG. 2. SHOWS SMITH'S TUNNEL DRIVEN ACROSS THE MEASURES TO CUT COAL SEAM

The three trolleys are joined by couplings, and a rope operated by an engine, draws the trolleys into the oven, which is closed by iron doors at each end. The doors are sealed with clay, and the fires lighted. The flames are thrown by baffle walls over the prepared coke, and carried by flues, having apertures at the level of the carriages, into one or two collecting underground flues, leading to the chimney, which is between the two ovens. In practice, after the first firing, the fires are not again lighted for subsequent charges, the heat of the oven being sufficient to set the gases burning. Coking takes from 36 to 48 hours. The doors are then raised, a third batch is attached to the hinder trolley, and the whole charge is pulled out and cooled by water thrown from a hose. This oven holds about $4\frac{1}{2}$ tons of coke.

A SECOND TYPE OF OVEN

The other type of oven used is of different construction. It also is longitudinal and is subdivided into a number

Moisture, 1.17; fixed carbon, 85.47; ash, 13.36. It requires about 120 tons of Bluff coal to make 100 tons of coke; this compares with about 160 tons of American coal to make 100 tons of coke.

The New Mine Rescue Station in Indiana

The new mine rescue station in Indiana will be opened by the Government, at Evansville, on Thanksgiving Day. After Nov. 24, the station will be ready at a moment's notice, day or night, to answer an emergency call. The installation will be under the charge of a foreman, a man with practical mining experience, who has been a miner, a fire boss, mine foreman, manager of a mine or an inspector of mines. Doctor Holmes, director of the Bureau of Mines, has not yet selected a man to serve as foreman of the Evansville station. The location of three of the nine new rescue stations recommended for the coalfields of the country,

The coal is anthracite, but is different from any Pennsylvania anthracite I have seen. Pennsylvania anthracite usually has a brilliant luster that is slightly brassy in color, but the Mt. Baker coal has a steel-gray cast, if such a term can be applied to a black coal. It has the usual conchoidal fracture of anthracite; some of the openings show it to be much crushed, but in other places it is solid. It burns in the customary manner of anthracite, but a considerable portion of the seams so far discovered show a rather high percentage of ash. Most of the development is in seams that stand at sharp angles of dip, 40 or 45 degrees.

The accompanying illustration, Fig. 1, shows the discovery tunnel of the anthracite field in the Mt. Baker district. The tunnel is located at an elevation of 4400 ft. in the foothills of Mt. Baker, six miles from Glacier, on the Nooksack river, the terminus of the Bellingham Bay & British Columbia railroad.

The full width of the seam, 11 ft., appears in Fig. 3, the dip being to the right,

roughly parallel with the fallen hemlock logs. The Washington Development Company, which owns the surrounding group of claims, is operating two diamond drills under Johannis Berg, an expert from South Africa. Anthracite from the nearby prospect holes has been used exclusively for raising steam for the drills, with good results.

Fig. 2 shows Louis Smith's tunnel in Sec. 30, T 39N, R 7E, situated $7\frac{1}{2}$ miles from Glacier. This tunnel was driven

drills are now at work prospecting to determine the location at depth of seams, which have been uncovered at the surface. A curious feature of the occurrence of this anthracite is the nearby presence of metamorphic sedimentary rocks, slates and schists; in fact, quartz veins are found quite near the coast. Doubtless, the small amount of volatile matter present in the coal is due in part to the metamorphic action that produces the slate and schists.

Recommended Changes in Indiana Mine Laws

INDIANAPOLIS CORRESPONDENCE

James W. Epperson, State mine inspector for Indiana, will recommend to the next legislature a number of changes in the law, which, after careful study, he deems necessary in order to throw greater protection about the men engaged in mining coal. The recommendations he



FIG. 3. SHOWING FULL WIDTH OF SEAM, THE DIP BEING PARALLEL WITH FALLEN HEMLOCK

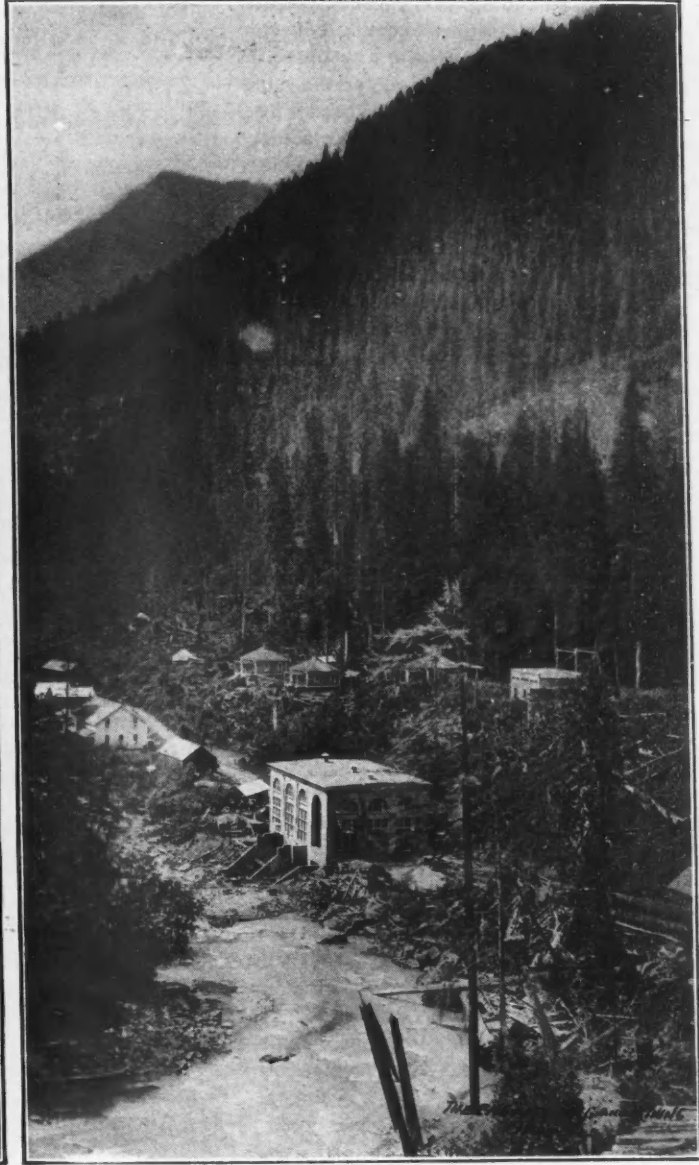


FIG. 4. VIEW OF POWER PLANT FOR HIGH-TENSION LINE OF WHATCOM COUNTY RAILWAY

across the measures of altered sedimentary rocks to cut the coal seam that had been prospected by a shaft.

A high-tension line of the Whatcom County Railway and Light Company passes through Glacier on its way from the power plant (Fig. 4), below Nooksack falls, 7 miles upstream from Glacier, to Bellingham, where most of the power is distributed and used.

Excellent trails have been built from Glacier to the properties. Two diamond

There are other claims which are about as good as those already patented, and it is likely that patents will be issued for some of them. The whole region has been tied up somewhat until patents could be obtained.

The largest cargo of iron ore ever loaded on the Lakes was carried recently by the steamer "Norman B. Ream," which left Escanaba with 13,410 tons of ore for South Chicago.

will present are due to present conditions, which are not unlike those at the scene of the Cherry disaster in Illinois, and briefly sums them up as follows:

A law providing that every driver in a mine shall be provided with a portable seat on the car adjustable to either end of the car, and making it an offense for him to ride in the car except when he uses such seat.

An amendment to the present law to

provide that all powder or other explosives shall be stored in boxes which shall be kept securely closed at all times, except when miners are preparing their cartridges or charging blasts, such boxes to be approved by the inspector of mines and not to be kept nearer than 100 ft. to any working face.

A law providing that all débris shall be kept out of the last "breakthrough" between rooms or entries.

EXAMINATION OF MINES

An act amending the present statute to provide that the time elapsing between the examination of any working place in a mine and the regular time for the miners to go to work, shall not exceed three hours, providing that when a place is found to contain gas, evidence of the fact, together with the exact time of the examination, shall be posted conspicuously at each entrance to the place, and that if a dangerous quantity is found, the words, "Gas; Keep Out," shall be posted, and providing further that the time elapsing between the examination and the time for working where dangerous gas is suspected, shall not exceed one-half hour. The amendment as proposed provides for the punishment of any mine official in charge of men who orders workmen to work in a place supposed to contain firedamp, unless examinations have been made and reported; provides for the punishment of workmen who knowingly enter when posted as dangerous because of gas; the amendment also provides for adequate records of examination, and for the surrender of the certificate of any fire-boss who shall sign a false report of an examination.

A law making it unlawful for any miner or other person to recharge a drill hole that has once been charged and fired. An amendment to the laws concerning illuminating oils for use in mines, fixing punishment and imprisonment for any person selling or offering for sale any oil for illuminating purposes that is inferior to that prescribed by law, and fixing like punishment for any person who uses coal oil, black jack or machine oil for illuminating purposes in a coal mine. A law requiring fire-hose equipment and water pipes running at least 400 ft. from the shaft along the main entries, and requiring the equipment of the mine with proper appliances for fighting fire in and about the tipples.

An amendment providing for the transportation of explosives in mines; and also providing that all electric wires and electric motors shall be so insulated as to prevent injury to workmen. There is also an amendment making it an offense for a miner to use a machine which is not provided with shields.

The Mexican mines are increasingly using gas producers for power purposes.

Lehigh & Wilkes-Barre Coal Company

This company is a subsidiary of the Central Railroad Company of New Jersey, and operates a number of collieries on the lines of that road. Its report for the year ended June 30 shows capital liabilities as follows: Stock, \$9,212,500, all owned by the Central Railroad Company; funded debt, \$20,011,058. The accumulated surplus was \$1,297,171 at the end of the year.

The coal statement for the year is as follows, in long tons:

	1908-9	1909-10	Changes.
Coal Mined.....	4,093,655	4,021,773	D. 71,882
Coal bought.....	844,001	815,969	D. 28,032
Total.....	4,937,656	4,837,742	D. 99,914
Coal sold.....	4,849,678	4,805,644	D. 44,034
Increase in stocks	87,978	32,098	D. 55,880

Of the coal sold 66.7 per cent. was of the large or domestic sizes, and 33.3 per cent. of the small or steam sizes. There has been set apart out of income 10c. per ton on all coal mined from property owned to represent depletion of coal lands. This amount is applied to sinking funds.

A supplementary statement of coal mined from the various properties of the company is as follows:

	By Co.	By Ten.	Total.
Coal Mined:			
From lands owned	2,885,315	962,577	3,847,892
From lands leased	994,789	140,576	1,135,365
Saved in washing	141,669	197,657	339,326
Total.....	4,021,773	1,300,810	5,322,583
Total, 1908-09	4,093,655	1,351,696	5,445,351

The total decrease was 122,768 tons. The coal bought, shown in the first statement, was 65 per cent. of that mined by tenants.

The earnings and expenses were as follows; the averages given being based on tonnage of coal sold:

	Amount.	Per Ton.
Coal sales.....	\$15,815,043	\$3.29
Miscellaneous.....	469,927	0.10
Total.....	\$16,284,970	\$3.39
Mining coal.....	\$ 6,656,819	\$1.39
Coal bought.....	2,034,350	0.42
Transportation, etc.....	3,796,442	0.79
Gen. exps., taxes, etc.....	588,173	0.12
Coal sold from stock.....	17,398	0.01
Depletion of coal lands.....	201,238	0.04
Total expenses.....	\$13,294,420	\$2.77
Net earnings.....	\$ 2,990,550	\$0.62

This is the only subsidiary anthracite company showing large net earnings. The cost of coal purchased shows an average of \$2.40 per ton, being \$1.03 more than the cost of mining. Adding the charge to depletion of coal lands brings the cost of mining coal up to \$1.43 per ton for the year. Mining costs include \$301,655 for royalties and \$236,693 for improvements. Transportation includes yard and agency expenses. Deductions from net earnings were: Interest and sinking funds, \$1,104,668; Federal income tax, \$22,279; Stanton breaker, \$65,-

000; depreciation of coal at Hampton storage plant, \$110,000; cost of refunding debt, \$271,869; dividends, 13 per cent., \$1,197,625; total, \$2,771,441, leaving a surplus of \$219,109 for the year.

The report says: "The funded debt maturing and to mature was provided for by an issue of \$20,000,000 consolidated 4 per cent. gold loan, secured by mortgage dated June 1, 1910, with a sinking fund providing for the payment of the bonds in installments of \$2,500,000 each five years.

"The amounts to the credit of sinking funds and depletion of coal-land fund, have been applied as follows: Coal land and equipment, \$2,131,864; advanced royalty for coal to be mined, \$2,336,027; total, \$4,467,891. While most of the advanced royalty will eventually be recovered, it was thought best to charge some off. Income account will receive credit each year for coal mined in excess of minimum payments.

"The Lehigh & Wilkes-Barre Coal Company (Mass.) was incorporated under the laws of Massachusetts, and the property located in that State was sold to that company. Its entire capital stock is owned by this company.

"One breaker was entirely rebuilt. At Inman Colliery No. 21, one shaft has reached the Baltimore vein, 1550 ft., and the second shaft is down 1250 ft.; as soon as this shaft reaches the Baltimore, active development of the colliery will be started. The breaker at Stanton colliery, producing about 2700 tons per day, was destroyed by fire Nov. 20, 1909; a new breaker of part reinforced concrete is under construction."

COLLIERY NOTES

The No. 4 mine of the Davis Coal Mining Company, in Yellowstone county, Montana, has been closed, owing to trouble with the miners. The mine has been producing about 250 tons daily with 149 men. No tonnage scale had been adopted and the men were being paid \$3.75 per day. The miners averaged 3½ tons per day each which, according to the management, is not sufficient. It is probable that a tonnage scale will be adopted when the mine reopens.

The British Bureau of Manufacturers reports as follows: The United States, with 690,438 persons employed in mining coal in 1908, produced 126,562,000 tons of coal more than was produced by 966,264 persons similarly employed in the United Kingdom, while the production of coal in the United States amounted to 538 tons per person employed in coal mining, against 271 tons produced per person in the United Kingdom. The value of the coal at the pit's mouth was \$1.93 per ton in the United Kingdom, against \$1.48 per ton in the United States.

i PERSONAL i

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

Victor M. Braschi, of Mexico City, is visiting New York.

J. L. Parker, of Victoria, B. C., is on a visit to eastern Canadian cities.

Fred T. Williams, of Salt Lake City, has been at Coalville, Utah, on professional business.

Olaf Wenstrom, formerly of Boston but now operating in Mexico, has been visiting New York and Boston.

J. P. Hutchins has returned to London, having completed examinations of placer mining properties in Siberia.

John Gross, of the firm of Draper & Gross, Denver, Colo., has gone to Sonora, Mexico, on professional business.

J. R. Finlay, general manager of the Goldfield Consolidated Mines Company, is expected in New York about the middle of November.

C. A. Grenfels, of London, director in the Southern Iron and Steel Company, spent the last 10 days in the Birmingham, Ala., district.

R. B. Lamb, of New York, mining engineer and metallurgist, has opened an office in the Traders' Bank building, Toronto, Ont., for general practice.

George Kingdon, assistant superintendent of the Old Dominion mine in Arizona and superintendent of the United Globe property, is in Boston on a vacation.

Karl Schneider, H. Schubert and M. Bohlan, from the Rombach Steel Works, at Rombach, Germany, were visitors in the Birmingham, Ala., district last week.

Quincy A. Shaw, president, and Rudolph Agassiz, vice-president of the Calumet & Hecla, are in the Lake Superior country on their semi-annual tour of inspection.

William Williams, chief engineer of the Susquehanna Coal Company, while making an inspection of No. 7 colliery at Nanticoke, Penn., Oct. 27., was badly injured by a fall of the roof.

J. W. D. Moodie will be at Salt Lake City for some time to come. He has been appointed general manager of the Tintic Mining and Development Company and its allied interests in Utah.

Max Drott, metallurgist for the Fried. Krupp Company, is at the Hotel Belmont, New York, and will sail on Nov. 9 for an extended trip through the principal mining districts in Central America.

W. B. Budrow, who recently resigned as manager of the smelting works at Fundicion, Sonora, and of the subsidiary mining companies connected with it is now located at Guadalajara, Mexico.

C. E. Schwarz, formerly general super-

intendent of the St. Louis Smelting and Refining Company, of Desloge, Mo., has returned to St. Louis from a two-months' professional engagement in northeastern Washington.

John Haertter has been appointed engineer of the Wyoming division of the Lehigh Valley Coal Company, with headquarters at Wilkes-Barre, Penn., succeeding Charles Enzian, who has gone to the Geological Survey.

George Böker, partner in the house of F. A. Böker, Bonn, Germany, general selling agent in Germany for the Calumet & Hecla Company, is visiting the United States, making his headquarters at the Waldorf-Astoria, New York.

W. F. Ferrier, for some time with the United States Smelting, Refining and Mining Company, Mammoth, Cal., and Henry Kehoe, Spokane, Wash., have been examining mining properties in Portland Canal district, British Columbia.

H. A. Buehler, director of the Bureau of Geology and Mines of the State of Missouri, lectured to the class in economic geology in the Missouri School of Mines on Oct. 17 and 19 on the "Origin of the Zinc Deposits of Missouri."

Colin McIntosh has resigned as general manager of the Ohio Copper Company. The resignation was submitted to the company last May. It is understood that A. Frank, an engineer for the Heinze interests, will assume this position.

A. E. Swain, for eight years past manager of the Tajo mine in the Parral district, Chihuahua, Mexico, has resigned, and will spend some time in the United States. H. H. Utley, formerly of Leadville, Colo., succeeds Mr. Swain at the Tajo mine.

O. F. Westlund, formerly manager of the Aguascalientes smelting works of the American Smelting and Refining Company, has become general manager in Mexico for the Mines Management Company, of New York. His office is at No. 48 Avenida 16 de Septiembre, Mexico City.

John P. Reese, late president of the Ogden Coal Company, Des Moines, Iowa, has been appointed general superintendent of the Superior Coal Company, at Gillespie, Ill. Mr. Reese has resigned as president of the Iowa Coal Operators' Association on account of his removal from the State.

John Fritz, the dean of the iron trade of America, has accepted an invitation to attend a testimonial dinner to be given in his honor by the Manufacturers' Club, Philadelphia, on the evening of Nov. 17. Andrew Carnegie is honorary chairman of the Committee of Arrangements, with Isaac Clothier, Charles M. Schwab, W. E. Corey, Charles Kirchoff and John Birkinbine as associates, the active chairman being Nathan T. Folwell, president of the club.

+ OBITUARY +

Valentine Wilson, an English mining engineer, was found dead near Guanajuato, Mexico, recently, under circumstances which left no doubt that he had been murdered. He had been in Mexico several years, coming from British Columbia, and he was at one time in Australia. In Mexico he was employed in Monterey for a time, but had been in Guanajuato for two years past.

Alfred Lundvall died at Guadalajara, Mexico, Oct. 20, aged 62 years. He was born in Sweden, but came to the United States when a young man, living in Wisconsin and later in Nebraska. He removed to Mexico 18 years ago and became interested in mines in the Hostotipaquillo district of Jalisco. He was instrumental in the organization of the San Antonio Mining and Milling Company, and was secretary and manager of that concern at the time of his death. His personal holdings in the district were extensive.

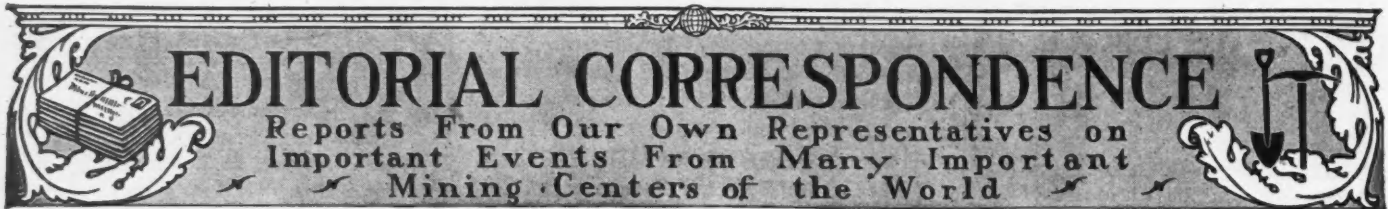
SOCIETIES and TECHNICAL SCHOOLS

American Mining Congress—At a meeting held in Butte, Oct. 21, presided over by W. L. Creeden, a temporary organization was effected for the purpose of forming a Montana chapter of the American Mining Congress. J. F. Callbreath, Jr., secretary, briefly outlined the purpose and the work of the organization.

Association of American Portland Cement Manufacturers—The next meeting will be held at the Hotel Astor, New York, Dec. 12-14. The Executive Committee meeting will be held Dec. 12. The business meeting will be held on Dec. 13 and on Dec. 14 an open meeting will be held, at which papers of interest to manufacturers and users of cement will be presented.

Utah Society of Engineers—The regular monthly meeting was held in the Newhouse building, Salt Lake City, Oct. 21. A paper upon "Manganese Steel" was presented by F. E. Johnson, of the Edgar Allen American Manganese Steel Company, and the discussion was led by J. R. Tempest, of the Utah Light and Railway Company. On Oct. 29, the society visited the new plant of the International Smelting and Refining Company, at Tooele, Utah.

Zacatecas Mining Association—At a meeting held at Zacatecas, Mexico, Oct. 16, a constitution was adopted and the following officers elected: G. C. Palmer, president; Parrish McDonald, vice-president; J. D. Hoffman, Carlos Bentley, Spalding and A. Sewell, directors; Edmondo von Gehren, treasurer; J. F. Barry, secretary. A committee was appointed to arrange for the affiliation of the society with the Mexican Institute of Mining and Metallurgy.



EDITORIAL CORRESPONDENCE

Reports From Our Own Representatives on
Important Events From Many Important
Mining Centers of the World

San Francisco

Nov. 1—The North California Mining Company has filed formal notice of abandonment of 60 mining claims along the North Fork of the Feather river in Butte county, located some years ago and on which annual assessment work has since been done. These are some of the claims originally located by H. H. Yard and subsequently turned over by him to the company. Numbers of the claims were doubtless located primarily for right-of-way rather than for mineral. The directors of the Butte & Plumas, railway anticipated, as soon as rights-of-way were needed in the cañon, that mining locations would be made in advance of the surveyors, so, through the North California Mining Company these mining locations were made. The Butte & Plumas later became the Western Pacific Railroad Company and rights-of-way through these locations were transferred and subsequently assigned to the Western Pacific. Lately the Northern California company has been testing all its claims and giving up those which would not pay to mine, and doubtless many others will later be abandoned formally. They still have numerous claims which promise a profit when worked.

When a few years ago H. H. Yard located, relocated or bought six or seven hundred placer mining claims along the North Fork of the Feather river in Butte and Plumas counties, he rather damaged himself and ultimately the oil industry of the State. He did annual assessment work on these gold mines to the amount of sixty or seventy thousand dollars a year, transferring them to the North California Mining Company, but when patent was applied for it was refused by the Government. The refusal was based on an allegation of fraud involving an attempt to segregate timber land under guise of a mineral claim. It was further ruled in the case that "valuable mineral" had not been discovered in the claims. The rulings of the Land Office following this decision are now decidedly hampering the oil industry of the State, and the oil men at Los Angeles have been trying to have Frank Pierce, first assistant secretary of the interior see this point. He has ruled that transfers of a claim of 160 acres of land before the discovery of oil was invalid. Mr. Pierce has gone to the oilfields for a few days and the attorneys opposing the decision must have their briefs ready for him by the end of the week.

Denver

Nov. 1—It is alleged by the mining men of this State that a great injustice is being done to the industry by the over-taxation of mining property, and a special committee, appointed by the Colorado chapter of the American Mining Congress to investigate, reported that taxes are being levied out of all proportion to other classes of property. It is said that many of the assessors levy on the gross output instead of the gross proceeds from the output. The non-producing mines in Teller county are assessed at \$1,787,000, or at a rate of \$59 per acre, which is out of all proportion to the general scheme of taxation and assessment in force, as the mines are not producing.

Thirty years ago in this State, the "armstrong hoist," as the windlass was dubbed, was the "plant" usually erected by the prospector; then came the "whip" and the whim, with the "hay-burner engine" to furnish the power, i. e., the poor horse, which, in the former, had to "back and fill" for the rise and descent of the bucket, and the latter, when he had to go 'round and 'round in a small and dreary circle to wind the rope around the drum which hoisted the bucket; then came the steam hoist, with all the bother and dirt of firing up with coal or wood. Now, since the Central Colorado Power Company has built its towers and transmission lines through the middle tier of counties, little electric hoists are taking the place of the old-fashioned, laborious or expensive methods, and the miner or prospector, when he goes to work in the morning, gaily turns on the "juice," and there you are!

Butte

Oct. 29—The workingmen in Butte are making a determined effort to secure beneficial legislation at the coming session of the State legislature and with that in view have recently put in the field a labor ticket on which only the names of those holding union cards appear as candidates for the legislature. The labor vote in Butte is normally Democratic, but at the local Democratic convention the workingmen claim that the nominations for members of the legislature were dictated by the Amalgamated company and that therefore only those friendly to legislation favorable to the company were selected. The conflict between organized labor on the one hand and the great mining corporations on the other is a constantly recurring affair at each State election in Montana. When the legislature is

in session representatives of organized labor are in attendance to urge the passage of employers' liability acts and compulsory safety devices for use in the mines, and they assert that their bills are always sidetracked by some invisible force and that in their stead are enacted laws which extend the already broad powers of the corporations. This division in the ranks of the Democrats makes it appear that a Republican victory is possible, but the Democrats have adopted as their battle cry the defeat of Thomas H. Carter for reelection to the U. S. Senate.

Recent reports from the Government officials show that an immense amount of timber was burned in Montana during the summer fires. The timber in these burned areas will be sold before it becomes decayed. The Anaconda company has suffered much by its timber lands being swept by these fires, but the loss will not materially affect the mine supply at present.

President B. B. Thayer of the Anaconda company has recently been in Butte on his periodical inspection trip. Speaking generally of the conditions of the properties he says: "The mines, so far as I have seen them, are looking magnificent. Development is being continued in all the properties, and some high-grade orebodies are being opened on the deeper levels. There has been no curtailment of the development anywhere and the mines are in splendid condition as to ore reserves and new discoveries."

Goldfield

Nov. 1—The officers of companies owning, leasing or operating mining property in Nevada and offering for sale any of its shares or capital stock are busy making reports giving information, as specified by the State law, relative to the operations and finances of their companies. The information required is complete and copies must be filed with the county recorder and the attorney general in May and November of each year. The clause "selling or offering for sale any of its shares or capital stock" is the cause of considerable uncertainty as to whether it will exclude all companies otherwise affected who have not offered for sale any stock during the last six months.

L. L. Patrick and associates have been declared elected officials of the Black Butte Reorganized Mining Company, by Judge Somers, of the District Court. The decision comes as a result of a suit brought by Patrick contesting an elec-

tion held July, 1910, at which Thomas F. Manning voted 645,587 shares of treasury stock, which according to the plaintiff were not entitled to voting power by proxy or otherwise. This contention was sustained and the following directors declared elected: H. C. Clapp, L. L. Patrick, T. C. Damsky, Fred Strain and Wm. Lapps.

Suit has been filed to quiet the title to the Christion Friend mine near Lida. F. A. Campbell *et al.* appear as plaintiffs and J. Gyurkovics, who claims an interest, is the defendant.

Cobalt

Oct. 29—The annual report of the La Rose for the year ended May 31, shows that 3,170,027 oz. of silver were produced at a cost of 23.27c. per oz. The cost of production in 1909 was 16.21c. per oz. and the higher figure for the present year is due to the fact that the expense of developing the Lawson and Princess properties has been included in the operating costs. The net value of the silver was \$1,472,005 and out of this \$900,000, or 12 per cent. of the capitalization was paid in dividends. The surplus amounts to \$473,470 an increase of \$52,000. The ore reserves are estimated at 5,544,000 oz. having an estimated net value of \$2,226,349. These latter figures are for La Rose only and do not include the Princess and Lawson, which are now in a position to make regular shipments. Since the close of the fiscal year the ore reserves have been maintained and the cash assets increased by almost \$200,000.

The outside interest in Porcupine is steadily increasing, as evidenced by the large corporations that are sending men in to look over the field. Besides the Consolidated Goldfields Company of South Africa who have taken an option on two veteran claims, it is now stated that Barnato Brothers have engineers examining properties for them. The entrance of such firms into the new goldfields argues well for the future of the district and if this work is satisfactory, will insure an abundance of capital.

Messrs. Flynn and Norrington are sending in a party to test the 45 claims in the Mattagami ironfields, which they own. The men are bringing in a churn drill and this will be operated all winter. This is the first serious attempt that has been made to test these deposits.

Toronto

Oct. 29—Gold discoveries are reported to have been made in the neighborhood of Hoban, on the main line of the Canadian Pacific railway, 120 miles north of Sault Ste. Marie. The first find was made in July last by William Norquist, a prospector from Sault Ste. Marie, who kept the matter quiet until he had located five claims. The news recently became known, and many prospectors from Haileybury and Sudbury are now on the

ground. It is stated that about 50 claims have been staked. The area is in township 49, range 27, Algoma district. Norquist is negotiating for the sale of his claims to Colorado buyers.

E. A. Wallberg, president of the Mines Power Company, supplying electric power to Cobalt, has undertaken the construction of the proposed Porcupine railroad. He states that the surveying parties are pushing their work as rapidly as possible, and expects that 10 or 15 miles of the road will be built this winter, and the remaining distance completed in the spring. It is the intention to use steam power until the road can be electrified in the summer.

There appears to be a growing feeling that the northern section of Ontario should be separated from the older portion of the Province. There has always been a great deal of dissatisfaction arising from the way this part of the country has been treated at the hands of the Ontario Government, and certainly there are many grounds for complaint. Although producing millions toward the revenue of the province, very little of this money has been spent in opening up the section from which it came. The fact remains, however, that nothing can be done, and until "New Ontario" is much stronger than it is at present, no action will be possible.

Mexico City

Oct. 27—The survey and plans for the new railroad in Durango from Tepehuanes to Guanacevi are completed and a commission is investigating the freight probabilities of the projected line. It is believed that the road will be built. Guanacevi is one of the important mining camps of Durango but has been retarded by the difficulty of access. There are a number of large mines which have been operated for three hundred years. The high-grade ores were shipped, leaving an immense tonnage of lower grade on the dumps. This low-grade ore could be shipped at a profit if railroad facilities were offered. It is therefore quite probable that a sufficient amount of freight will be promised to warrant the building of the road. The distance is about 75 miles.

London

Oct. 20—But few of the exploration companies floated five years ago to develop mines in Egypt have made good. The most promising is the Barramia Mining and Exploration Company, whose annual meeting took place recently. This company is the successor of the Egypt & Sudan Mining Syndicate, having purchased the property from the latter for £5000, and £29,350 in shares.

The Egypt & Sudan syndicate has discovered a rich body of ore below the ancient workings at a depth of about 130 ft., from which 1460 tons of quartz had been extracted, yielding £11 15s. per ton.

This shoot has been worked to 75 ft. below the 130-ft. level by means of a winze, but, the ventilation being imperfect and water having been encountered, work had to be abandoned pending the sinking of a shaft to the 250-ft. level, and crosscutting to the vein. This the Egypt & Sudan Mining Syndicate had not sufficient funds to carry out, hence the sale to the present owners.

During the year under review the shaft has been sunk the required depth of 250 ft., and crosscutting to the rich shoot is well under way. Much development has also been done on parallel veins with encouraging results, the ore from a drive assaying 7 oz. gold per ton for 80 ft. of the drive. Ninety-eight feet of driving on the main reef developed a strong vein averaging 4½ ft. wide, assaying 11 dwt. gold for the full length developed.

During the year 583 tons of quartz were crushed in the five-stamp mill, producing an average £26 19s. 6d. per ton. The total revenue was £15,588, and the net profit for the year £4008.

The amount and grade of the ore developed during the year certainly appear to warrant the additional five stamps it is proposed to erect on the mine. It cannot be said of this company that it is making the common mistake of putting in a larger mill than developments warrants.

The mine is 60 miles from rail, in a desert beside which most of Arizona would look like a flower garden.

The Nile Valley is another Egyptian flotation which shows promise. Work is, however, practically suspended by one of those unforeseen and unforeseeable accidents which occasionally arise to exasperate the shareholder. The company is dependent on Nile steamers for all its supplies. Navigation on the Nile is suspended, owing to the repairs being made on the Assuan dam.

The Great Cobar copper mine reports over 3,000,000 tons of ore reserves, just under 3 per cent. copper, and having a recoverable content of 2½ per cent. copper, making a total of about 75,000 tons of recoverable copper in sight in this Australian mine. Every ton of copper produced carries £25 worth of precious metals. A good stroke of business for this company was the purchase of the Cobar gold mine, containing a low-grade quartz, adapted for lining the Great Cobar converters. The management reports that the gold contents of this ore enables it to work at the same profit with copper at £55 per ton as they could perviously with copper at £70 per ton. The present profit per ton of copper produced amounts to about £33, this is equivalent to producing copper at about 5½c., so the company is in an exceptionally fortunate position, and the low price of the metal can have no terrors for it. A profit of \$4½ to \$5 per ton of ore smelted is confidently expected.



THE MINING NEWS

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

Alaska

H. E. Ellsworth, assayer at Seward, is planning the installation of a small cyanide plant and stamp mill.

The first custom mill to be erected in the interior is now being erected at Chena under the direction of Martin Harris. The equipment consists of a 10-stamp mill, crusher and concentrating tables, and will be ready for operation early this winter.

Alaska Gold Mining and Development—This company, capital \$200,000, J. W. and H. Hennis, of Elma, Wash., incorporators, will begin next spring to dredge the beach sands of Nome. Hennis Brothers have a patented dredge.

Jupiter-Mars—Development on this claim is being prosecuted by the Redwing Leasing and Mining Company, of Fairbanks, which has a lease.

Valdez Mining Company—This company has been incorporated at Valdez by Frank Kernan, S. Blum and John Lyons, and will begin development on the Iehl-Erickson property.

Perseverance—This company will install 60 stamps next Spring, and work will be started on the building at once. J. R. Mitchell, of Juneau, is superintending.

Nevada Creek Tunnel—It is the intention of the owners of this property to operate on an extensive scale. P. C. Stoess, of Seattle, has charge.

Gold Stream—Development on this claim under the direction of A. A. Wakefield, Ketchikan, is meeting with encouraging results.

Arizona

COCHISE COUNTY

A number of the directors of the Calumet & Arizona and Superior & Pittsburg companies are at Bisbee, for the purpose of making a thorough examination of the properties preliminary to any definite action concerning the proposed consolidation. Reports from Doctor Douglas and Doctor Ricketts have been received. The probable basis of consolidation will be between four and five shares of Superior & Pittsburg for one of Calumet & Arizona, according to Thompson Towle & Co., of New York.

Shattuck - Arizona—The Shattuck is making regular daily shipments of from three to five cars to the Copper Queen smelter, at Douglas, from development.

GILA COUNTY

Summit—This Duluth company is developing the Gibson property, 16 miles northwest of Globe. A vertical three-compartment shaft has been opened to 300 ft. and will be continued. Crosscutting is being done and low-grade ore production is expected to be begun soon. W. A. Eaton is president.

YAVAPAI COUNTY

Jerome Verde—The main shaft on the Columbia claim is down 568 ft. and will be continued to 600 ft., when crosscutting will be done. Eli Barrett is engineer.

Arkansas

In the Yellville district the Yellow Jacket company has closed a deal for the purchase of the Philadelphia mine, near the mouth of Clabber creek, and will equip with a concentrating mill. This company has been operating on the Burrus tract, on Buffalo river, about two miles above the Red Cloud mine, for a year. The Philadelphia is about three miles nearer the railroad shipping point than the Burrus tract.

Lincoln—This mining company, J. R. Barnett, secretary, is developing zinc-lead deposits at Imboden, Lawrence county.

California

KERN COUNTY

Butte—About 200 ft. up the hill from the old workings in this mine at Randsburg, Patrick Fahey has discovered ore fully as good as that in the old vein at the surface.

MARIPOSA COUNTY

Sixty acres on the Merced river, near Merced Falls has been sold by Frederick McCall to a syndicate headed by Francis Cook & Co., of Boston, and Charles Gifford, of New York, and an option has been taken on 60 acres adjoining. An old river channel is supposed to exist at that point. At any rate considerable gold has been taken out of the placers. The ground is to be worked on a more extensive scale, and pumps, motors and transformers have been purchased for the power-pumping plant, to be erected on the river. This plant is to lift water to the ground to be hydraulicked. Current will be furnished by a local power company. Mr. McCall will be the local manager.

Champion—This mine near Coulterville, under lease to Bagby, Quinn & Wilburn, is working 15 men and the 20-

stamp mill is busy. The last clean up was \$14,800 from 250 tons.

Mountain King—This mine near Bagby is adding 20 stamps to its 20-stamp mill and will increase the force from 100 to 200 men. William Thomas is superintendent.

MODOC COUNTY

Fort Bidwell Consolidated—This company has ordered a stamp mill and machinery to be placed on the Mountain View claim. Ore from the Sugar Pine will be brought down by aerial tramway, the towers for which are now being placed. Algernon Del Mar is manager.

Big Four—The lessees of this mine at Fort Bidwell have decided to purchase a five-stamp mill. John Brown is in charge.

NEVADA COUNTY

North Star—A new hoist is being placed at the Central shaft of this mine, Grass Valley, and the old hoist will be removed to the Cincinnati, an old claim owned by the company.

Cassidy Consolidated—Arrangements are being made to put in a heavier pumping plant at this mine, Grass Valley, F. C. Longe, manager.

Blue Lead—Gravel averaging \$3 to \$4 per car has been cut in this mine at Relief hill, Oscar Jones, manager. It is thought the long sought channel has been found.

Erie—At this mine, Graniteville, the capacity of the mill will be increased and the shaft deepened.

National—This company at Meadow Lake is hauling in supplies and machinery and will continue work all winter.

Rose—This quartz mine near Onion valley has been developed by tunnels and crosscuts during the summer and a large body of free milling ore found. A Knight ball mill is on the claim. The mine is operated by Mrs. Julia Kelley.

SHASTA COUNTY

Balaklala—One furnace has been started up, the Cottrell process being used in connection therewith. The latter has been reported as giving satisfaction, but our own information is to the effect that several difficulties have not yet been definitely overcome.

Mountain—It is rumored that this company will erect a new smelter at Keswick.

Mammoth—The third furnace was recently blown in, but the baghouse was unable to filter so much smoke and the furnace had consequently to be blown out.

SIERRA COUNTY

Oriflamme—A vein carrying \$9 per ton has been cut in the tunnel of this mine near Alleghany, C. C. Ward, manager. The mine will be worked all winter.

Sixteen-to-One—The bond having expired on this property at Alleghany, it has reverted to its owners, T. H. Bradbury, of San Francisco, Y. C. Lawson, of Berkeley, and Thomas Bradbury, of Alleghany.

Sierra Buttes—The 20-stamp mill at the No. 5 level of this mine at Sierra City has been started and the 40-stamp mill at the lower workings will shortly follow. Jay C. Folsom is manager.

Keystone—This mine is now being run under a lease. The pay shoot being worked is found 6000 feet from the mouth of the main tunnel at a depth of 700 ft. There is a 10-stamp mill on the property.

SISKIYOU COUNTY

Golden Eagle—A company is about to take hold of this mine at Fort Jones and sink the shaft 200 ft. deeper.

Aiken-Graham—This company, operating the Doggett placer on the Klamath river near Oak Bar, has put a steam shovel in operation.

TRINITY COUNTY

Keating—The Siskiyou Syndicate has had the machinery for this mine hauled to the head of Coffee creek and is now packing it over the mountain. A stamp mill is included.

Trinity—This company, at Carville, has completed its 200-ton mill, and the 125-ft. span bridge across the Trinity river, and the light and power plant. The flume will carry 2000 inches.

TUOLUMNE COUNTY

Tuolumne Consolidated—The dredge on this property near Sonora has been dismantled and stored.

Colorado

CLEAR CREEK AND GILPIN COUNTIES

The McKinley, Homestake, Bovie and Elizabeth groups in the Beshears camp are being actively developed.

Escondado—This property, owned by James Beshears, from whom the new gold camp in the upper Clear Creek district got its name, has shipped one ton of selected ore, which came from a shaft 14 ft. deep only, and was settled for at the rate of \$82 in gold to the ton. It is claimed that he has 5 ft. of \$30 ore in the bottom of the shaft.

Black Diamond—Free-gold ore has been found in this mine, in the Beshears camp, 38 ft. in from the portal of the adit level. Cabins and blacksmith shop have been erected. The owner, J. G. McGuire, will develop during the winter.

Euclid—A strike of 6 in. of free-gold ore is reported from this mine, in Black cañon, in the northern section of Gilpin county.

Kokomo—This mine, which is on the same vein as the Addudell and Frontenac, recently floated in London, is being worked by a pool of Central City men, and is said to be shipping about 80 tons of gold ore per month, the first class returning \$32 per ton, and the second class \$18 per ton.

Banzai—This mine, supposed to be on an extension of the Fisk vein, on the east side of the gulch, near Black Hawk depot, formerly known as the "After Supper," is owned by the Pearl-Tatam Company. Boellert & Co. are leasing and last week shipped 3370 lb. to the smeltery which, it is said, was settled for at the rate of 13 oz. gold per ton and 186.4 oz. silver. A shipment of 6667 lb. of second-class ore yielded 2.64 oz. gold and 37.84 oz. silver.

Topeka—This mine, in Russell district, has finished sinking to 1300 ft., and is drifting east and west on the 1200-ft. level on good ore. The ore is treated at the Iron City mill, at Black Hawk, by concentration.

Smuggler—Shipments from an 8-in. streak on the fourth level opened by Parchine and associate lessees, are said to have returned 500 oz. silver per ton and 43 per cent. lead.

Pelican—The mill is running one shift, and sending out \$50 lead concentrates.

Golden Glory Tunnel—The portal of this tunnel is on Saxon mountain, and the entry has been driven 500 ft., and is now being pushed ahead to catch the Bellevue-Hudson vein. J. F. Puchert is manager.

LAKE COUNTY—LEADVILLE

Dinero—According to the annual report of this company, operating in the Sugar Loaf district, the development, drainage and transportation tunnel has been driven 3500 ft. in four years, and since the first of the year the ore taken out of veins intersected has more than paid operating expenses. August ore sales netted \$6000.

Silent Friend—Sam Doran and partners, leasing on this mine, in South Evans, are shipping 50 tons of ore per day of a grade, it is said, of \$20 per ton.

Stevens—In this shaft, in California gulch, extensive bodies of carbonate of zinc are being opened, and regular shipments are being made.

Maid of Erin—Five hundred tons of zinc ore found standing in this mine, and shipped gave returns, it is now definitely stated, of an average of 37½ per cent. zinc.

Louisville—This mine, on Iron hill, is being worked through a lateral from the Yak tunnel, by Hanifer & Reynolds, and is shipping 1200 tons per month of zinc sulphide.

Resurrection—A trial lot of two cars of zinc-carbonate ore has been sent out. Large bodies of this ore are said to have been found in the mine.

SAN JUAN DISTRICT

The Queen City mine, in Ohio Gulch, three miles from Silverton, has shipped a car which gave net returns of \$4420. The Kansas City has made its last shipment of 600 sacks, which netted \$1500 per ton. The company will work in the lower tunnel to cut the deposit 325 ft. deeper. The Colorado Copper Company, under the management of I. C. Atkinson, is beginning on the Homestake group, Porcupine gulch, and will drive 300 ft. to cut the Homestake lead 200 ft. below the surface. This property adjoins the Old Hundred which, it is rumored, will commence operations under lease in November. At Animas Forks, Charles Gagner, superintendent of the Frisco tunnel, has opened 5 ft. of galena chalcopryrite ore for 300 ft. on the Old Red Cloud lode. The Frisco tunnel is in 5800 ft. The Columbus mine is driving through Houghton mountain from the Animas Forks side to cut the Columbus vein. The No. 1 mine, in Buffalo basin, above Ice Lake mill, is drifting on 18 in. of galena, carrying 20 to 30 oz. silver. On level No. 3 of the Silver Ledge mine, two new orebodies have been opened in a talc gangue. The Intersection mine, in Maggie gulch, will be operated under lease for the winter.

Camp Bird—In September the mill crushed 6690 tons, the receipts were \$150,327 and the net profit \$100,303.

Mollie C.—A strike of 8 in. of gray copper ore, yielding 136 oz. silver to the ton, is reported in this mine, situated in Topeka gulch, San Juan county.

TELLER COUNTY—CRIPPLE CREEK

Mollie Kathleen—This mine, on Womack hill, and said to be an extension of the Gold King vein, is reported to have opened a body of ore 7 ft. wide, which assays \$30 per ton gold from wall to wall.

Ajax—Henry & Co., leasers on block 13, are said to have opened a vein 2 ft. wide of high-grade ore, and for a length of 50 ft. already. A car has been shipped. It is supposed to be an extension of the Mulvaney vein.

Stratton's Independence—Results for September are: Production 1680 tons, averaging 22 cwt. 16 gr. per ton. Dump ore milled, 7600 tons. Net working profit mine and mill, \$10,750.

Idaho

Coeur d'Alene Nellie—The Nellie will resume shipment this winter. Recently the property was bonded and the work has opened up a large oreshoot.

Stewart—A body of galena ore has been encountered on the 100-ft. shaft level. A station is being cut at the 200-ft. shaft level to run another drift. The shaft was sunk from the lowest working level in the mine. The Stewart is producing steadily at the rate of 1000 tons of concentrates monthly.

Indiana

GIBSON COUNTY

A well on the Brown farm in the Oakland City oilfield by the National Refining Company has been producing 150 bbl. of oil and 1,000,000 ft. of gas per day for two weeks. The long flow from this well has stimulated oil exploration. A number of new wells are being drilled and several old wells will be drilled deeper. The field is widening out toward the east.

LAWRENCE COUNTY

Complaints have been sent from this county to the Indiana Railroad Commission of confiscation by the railroads of coal consigned by the mine operators to other parties. There is a statute which permits a railroad company to confiscate coal consigned to another, in cases of emergency, but the commission is unable to understand why it should be necessary to take the coal at this time of the year, especially since all of the mines are being operated. The confiscation is being investigated.

ST. JOSEPH COUNTY

American Peat Product Company—A factory has been completed at a cost of \$100,000 at Lakeville, and will soon begin making a substitute for coal out of the muck which abounds in the marshes of northern Indiana. The company intends to open similar factories in Canada, Maine and Minnesota. J. H. Van Glahn invented the machinery and is manager of the Lakeville factory.

VERMILION COUNTY

Miami Coal Company—This company, which sank a shaft on the Chicago & Eastern Illinois tracks south of Clinton, about a year ago, has begun work on another shaft in the neighborhood which was formerly abandoned on account of sand. A steel shoe is now being used in the sinking and holds the sand. The old Oak Hill mine, which last year was sunk to the Rider vein, proving of little value, is being lowered to vein No. 3 below.

VIGO COUNTY

Diamond Corners, a coal mining town recently wiped out by fire, will not be rebuilt. The Diamond Coal Company announces that its mine there is about worked out and that it will sink a shaft in another locality.

Carbon Coal and Clay Company—This company has been incorporated with a capital of \$50,000 to acquire and operate coal property and to engage in the production and distribution of coal and clay products. The operations will be carried on in Vigo and Clay counties, and the home office will be in Indianapolis. The directors are William C. Shoemaker and William R. Mayo, Indianapolis, John N. Balch and Charles H. Ehrman, Terre Haute.

Massachusetts

Massachusetts Coal and Power Company—The United States Circuit Court, at Boston, has appointed Irwin McDowell Garfield receiver of this company, on application of creditors. The company was organized in 1909, with W. H. Hastings, of Malden, Mass., as president, and \$3,650,000 stock. The purpose was to operate a coal mine at Mansfield, Mass., on a deposit similar to that in Rhode Island.

Michigan

COPPER

Algoma—This company's shaft is down about 105 ft. and due to the pitch of the formation the shaft is not bottomed square in the ore, and a crosscut is under way toward the hanging wall. The crosscut is breasted in the same grade that has characterized this property from its opening. The second drill hole, sinking to determine the pitch of the formation, is down 670 ft., and at 350 ft. a rich amygdaloid lode was penetrated.

South Lake—The company has started its No. 6 drill hole to further determine conditions of a series of lodes exposed in holes 3, 4 and 5, and with this additional data steps will be taken toward shaft sinking.

Superior—It is probable that rock shipment will be discontinued to the Atlantic mill and one of the mills under the Calumet & Hecla control will be used to treat this rock. At the Allouez-Centennial mill the sixth head is ready and may be utilized on this rock or one of the head at the main mill, at Lake Linden, given over for a thorough test of this rock.

Lake—The company, through William A. Paine, president, announces: "To provide funds for exploring, developing and equipping the mine during the next 18 months, your directors deem it for the best interests of the company to sell the 13,450 shares of stock remaining in the treasury. An offer has been received to underwrite the entire amount at \$35 per share for an underwriting commission of \$2 per share. This offer will net the treasury \$443,850, and has been accepted. The company will then have outstanding 100,000 shares of a par value of \$25, on which \$3 per share has been paid. Stockholders of record at the close of business on Nov. 7, 1910, are offered the right to subscribe to this stock at \$35 per share on the basis of one share for each seven shares then owned."

Montana

BUTTE DISTRICT

Anaconda—At the Badger State mine about 350 tons are being produced daily. The concrete foundation for the change room has been completed. At the East Colusa mine the output is about 400 tons daily. At the Mountain Consolidated

mine a large body of commercial ore has recently been opened on the 2200-ft. level. The company's output will equal about 16,000,000 lb. per month at the Washoe smeltery and 6,000,000 at the Great Falls smeltery, making a total of 22,000,000 lb. Sinking on the Belmont shaft will be continued to 2400 ft. Tests are being made at the smelteries for the purpose of ascertaining the efficiency of Montana coal to replace that now being used, which comes from Wyoming. In the vicinity of Great Falls there are large bodies of coal which will be utilized at the Great Falls smeltery in case the tests prove satisfactory. In the issue of the JOURNAL for Oct. 8, the output of the West Colusa mine was inadvertently given at 50 tons daily whereas its output is 500 tons. A deed has recently been filed from the Frank Realty Company to the mining company, conveying a one-half interest in the Kentucky lode claim, a three-eighths interest in the Silver Lode claim and a one-third interest in the Silver City Lode claim. The deed is signed on behalf of the Frank Realty Company by A. W. Goldsmith, president, and Alva W. Goldsmith, secretary.

Butte Monitor—This tunnel company's property, including the Monitor, Sunlight, East Fraction, Alta, Burner, East, Ironside, No. 1, and Emporium, Quartz Claims, was recently sold by the sheriff in satisfaction of a judgment for \$725. Attorney's fees in favor of James H. Baldwin. The property was bid in by E. L. Chapman, representing James A. Murray, who holds a majority of the company's stock in pledge for a loan to William Switzer.

Elm Orlu—About 400 tons of zinc ore is produced daily. The shaft is 1200 ft. deep. The ore in the old dump is now being hoisted to the ore bins and shipped.

Butte & Superior—The repair parts for the wrecked east side of the hoist are being put in place. The output is normal, the "chippie" cage being used in conjunction with the west side of main shaft to hoist ore.

Raven—Under a working agreement with the Anaconda company, which owns a one-seventh interest in the Snoozer claim, the Raven company will work the mine. The agreement dates from Oct. 1, 1910.

Parrot—The directors have declared a 15c. dividend, payable Nov. 28. Previous to Sept. 7, 1910, no dividend had been declared for three years and the cause for the present dividend is that Parrot received in exchange for all its property, stock of the Anaconda company which is now paying dividends into the Parrot treasury.

Davis-Daly—The annual report of the company shows that on June 30 the assets were \$702,137, liabilities \$157,248, cash on hand \$83,759. President Heinze's report states that on the 1700-ft. level a

vein from 2 to 6 ft. wide is now being drifted on but the ore is not uniformly commercial. On the Silver King claim leasers have cut a vein running 6 per cent. copper and have sunk a winze 50 ft. on the vein. No production is being made at present.

JEFFERSON COUNTY

Montana-Corbin—The Western Mining Supply Company of Butte has recently been granted a default judgment against the mining company for \$1441.

LEWIS & CLARK COUNTY

Marysville—The company has been incorporated by George J. Scharschurg, Rudolph Horsky, S. W. Langhon, Will H. Smith, Edwin S. Booth and Edward F. Beadle, capital \$400,000, shares of \$1. The property is in Towsley gulch four miles west of Marysville, and comprises the Midsummernight's Dream, owned by the company, and the Bell Boy, Gleason, Towsley, Nile and General Lee quartz claims, held under lease and bond. A tunnel is now being driven, which will drain the Bell Boy to the 500-ft. level, and a 10-stamp mill will be erected.

Montana—The judgment for \$203,129, against this mining company and in favor of the St. Louis Mining and Milling Company for damages for the conversion of ore has been affirmed by the U. S. Circuit Court of Appeals at San Francisco.

LINCOLN COUNTY

Shaughnessy Hill—The management states that 4 ft. of shipping ore and 26 ft. of concentrating ore have recently been cut. A car has been shipped to East Helena.

Nevada

ESMERALDA COUNTY

Yellow Tiger—Low-grade milling ore has been opened on the 700-ft. level. The formation is a silicified dacite.

Goldfield Annex—The 1025-ft. level is being prospected. The raise to tap the shoot opened on the 800 is not yet in ore.

Daisy—The Morrison lease on this Diamondfield property is maintaining regular ore shipments.

HUMBOLDT COUNTY

J. L. Safford reports the discovery of a high-grade gold-silver-lead lode on the Mammoth claim of the property of the famous old Sheba Mining Company. The ore was disclosed in unprospected ground within 10 ft. of the surface.

Chaffee, the gold camp south of Winnemucca, under court judgment has passed largely into the control of the McCornick interests, of Salt Lake City.

LANDER COUNTY

Maricopa—This company has completed the compressor plant at True Blue tunnel in New York cañon and has begun the driving toward the Patriot property, a distance of 3650 ft. A 100-ton cyanide

mill has been ordered and an electric power plant will be installed of 300-h.p. capacity. The company owns the Patriot, Morrison-Cable, Chase, Annie and True Blue properties.

Austin-Manhattan—The construction on the Huff process plant is fast nearing completion. The mill will be in commission soon.

NYE COUNTY

Round Mountain—The jury in the case of John F. Davidson vs. Round Mountain Mining Company, rendered a verdict in favor of the plaintiff, who alleged wrongful extraction of ore from property which he held under lease. The jury fixed the value of the ore at \$82,000, but under the law this amount may be doubled by way of compensatory damages.

Buffalo—The five-stamp mill being installed near Manhattan is ready.

Tonopah-Belmont—The Belmont vein has been picked up to the east of the fault encountered on the 1100-ft. level. After cutting 12 ft. of faulted ground the earlier andesite was again encountered, but a 53-ft. crosscut in a northeasterly direction disclosed a 14-ft. vein almost identical with the original vein, which had already been followed for 700 feet.

Tonopah—A plant is being installed to equalize the drain on the main lines of the Nevada California Power Company. Fluctuation will be eliminated to an extent and economy effected.

Tramp Consolidated—The company mill, at Rhyolite, is in commission as a custom plant. The leasers are not able to supply 40 tons a day (the capacity of 10 stamps), but half a dozen operators are making regular shipments.

WHITE PINE COUNTY

Boston-Ely—The directors have decided to resume shaft sinking.

Blackhorse—The final payment on the purchase price of \$50,000 has been made to Tommy Watkins, by D. Austin Brown, of Boston and A. G. Burrett, of Salt Lake, who will commence the development on an extensive scale.

New Mexico

Chino—At the end of September it was claimed that this company had 24,598,879 tons of developed ore and 4,346,465 tons of partially developed ore, a total of 28,945,344 tons, averaging 2.68 per cent. copper.

Superior—This mine, at Lordsburg, owned by the Calumet & Arizona, will ship soon to Bisbee. Alfred Paul is in charge.

Lone Rock—Plans are being made by McPherson & Copp for the development of this claim, in Las Animas district, Sierra county, on which is a body of manganese ore reported to run from 32 per cent. to 64 per cent. manganese without sulphur, silica, or phosphorus.

New York

Witherbee, Sherman & Co., of Mineville and Port Henry, who recently purchased the Arnold hill iron-ore lands in Clinton county, will start at once to develop. A shaft will be sunk.

Oregon

BAKER COUNTY

Phoenix—This property in the Greenhorn district has been leased to Harry Wilson, Sumpter.

Nuggett—This group is being worked under the direction of A. J. Denny, Sumpter.

Floyd—This property has been leased to Frank Pierce and Charles Coleman, of Greenhorn, who will start development.

Pennsylvania

Philadelphia & Reading Coal and Iron Company—The financial statement for the three months of the fiscal year from July 1 to Sept. 30 shows gross earnings, \$5,686,397; expenses, \$6,081,201; deficit, \$394,804. As compared with the corresponding period in 1909 there was an increase of \$271,243 in gross earnings, and an increase of \$167,717 in the deficit.

Pittsburg Coal Company—This financial statement for the nine months ended Sept. 30 shows earnings over operating expenses, \$3,356,414. Charges were \$607,370 for depletion of coal lands; \$675,817 for depreciation of plant and equipment; \$739,666 for interest; total, \$2,022,853, leaving a surplus of \$1,333,561. As compared with 1909, there was an increase of \$1,169,108 in net earnings; and an increase of \$1,101,961 in the surplus.

Texas

Silver Hill—This mining company has been incorporated at Marfa to operate a silver property, formerly a producer, 48 miles southwest of Marfa in Presidio county. R. K. Colquett is first-incorporator.

Utah

JUAB COUNTY

Bradley—A compressor has been moved out of this property in North Tintic, and will be installed shortly.

Emerald—Prospects for finding ore on the 1100-ft. level are considered good. Work at greater depth will probably be carried on through the Opex shaft.

Utah Mine—A shipment from this mine, Fish Springs, of 47,842 lb. netted \$2637, after paying transportation charges. The shipment carried 47 per cent. lead, 171 oz. silver, and 60c. gold per ton.

IRON COUNTY

Horseshoe—This property at Fay, just over the Nevada line from Gold Springs, is reported to have been bonded to J. R. Cowell, representing an English com-

pany. Preparations are being made to start work. The mine is being thoroughly sampled, and a large mill test will be made on the low-grade ores above the 400-ft. level. Cyanide tests are being made on mill tailings. The dump contains about 40,000 tons. There is a 150-ton mill on the property, also a compressor and hoist. The ore carries gold and silver, and occurs in fissure veins in andesite. The mine was formerly operated by several companies, but the pay shoots have been exhausted and little attempt has been made to keep development ahead of production. The property is near the Snowflake and Jennie mines.

PIUTE COUNTY

Considerable interest is being taken in the Marysvale district on account of the rich strike made in the DeWitt lease.

Bully Boy & Webster—Ore is being mined by the DeWitt lease from the tunnel, and from a winze below this level. A carload has been hauled to the railroad at Marysvale, which is expected to run \$50 per ton in silver and gold. The DeWitt lease expires Nov. 14, and effort is being made to mine all the ore possible. The high-grade streak is 15 in. wide.

Log Cabin—The Franklin tunnel, which is being driven by Philadelphia interests, is reported to have cut a 30-ft. vein, which carries as high as \$8 to \$10 in gold and silver. The tunnel is in 2700 ft., and is thought to have tapped the vein which outcrops on the Bradburn and Log Cabin claims.

Shamrock—Five cars of ore have been shipped since operations started about a year ago. The last car carried 42 oz. silver, \$20 gold, and 6 per cent. copper. There is considerable second-class ore on the dumps, which is stated to run \$8 to \$10. A winze is being sunk from the lower tunnel in ore from 1 to 7 ft. wide.

Cascade—Development is being done on this property, which adjoins the Shamrock on the west. Some ore is being mined and piled for shipment.

SALT LAKE COUNTY

Bingham-New Haven—At the annual meeting in Salt Lake City, Oct. 21, the following officers were elected: L. E. Stoddard, president; E. B. Critchlow, vice-president; T. W. Farnam, secretary and treasurer; C. H. Doolittle, general manager. The company owns 500 acres near the Utah Consolidated. A new body of copper ore was developed recently, which is reported to carry 4 per cent. copper and to have been opened about 200 ft. on the strike. Shipments of between 200 and 300 tons daily are being made to Garfield.

Montana-Bingham—The lower tunnel has cut low-grade ore for 140 ft. It is being driven for the Quinn fissure, which is still 200 ft. from the face.

Starless—It is reported that Eastern interests are trying to get an option on this group of claims, owned by Col. E. A. Wall. The property adjoins the Utah Copper.

Utah Mines Coalition—The tunnel broke into a body of silver-lead ore, Oct. 21, which further development has shown to be up to 6 ft. thick. Where cut the ore contained a streak 14 in. wide which ran 59 per cent. lead and about 1 oz. of silver for every lead unit. Four mine cars of first class have been taken out in development. A contract has been made with the Knight Power Company to furnish electric power, which will replace the gasolene now used. The tunnel is in 4000 ft., and cut the vein 600 ft. below the deepest workings. Ore bins are being built.

Canton—This company has filed articles. The capital stock is \$100,000, shares \$1. The company has acquired a group of claims in Big Cottonwood. D. J. Williams is president.

K. & P.—These claims lie between the South Columbus and West Columbus, in Peruvian cañon, running into Little Cottonwood. Seventeen inches of ore, carrying gold, silver and copper, is reported in the face of the 200-ft. tunnel.

Rainbow—On Oct. 22 the tunnel broke into mineralized country rock, carrying galena. The property consists of about 14 claims on the south side of Little Cottonwood, near Alta. R. J. Jarvis is manager.

SUMMIT COUNTY

It is reported that the Grasselli zinc plant at Park City will build an addition capable of handling 125 tons of tailings per day.

Daly-West—About 21 leases have been given, and 60 leasers are at work. Carson & Roberts, who have a block of ground on the 900-ft. level, have shipped a 26-ton lot, that ran high in silver. On account of the leasers some unusually rich ore is being shipped. The company is extending the 1550-ft. level toward the Daly-Judge.

Ontario—Regular shipments are being made from the Crowther lease, which has 40 men at work. The ore is hauled to the Park City sampler. H. M. Tyler has taken a lease on another part of the mine, and will start work soon. The small bodies and bunches of ore left can be worked to better advantage by leasers than under company direction. The royalties and tunnel water rights bring in enough income to keep up repairs on the property. Unless new veins are opened by the lessees, it does not seem probable that the company will again work the mine.

TOOELE COUNTY

Lion Hill—This company, backed by Boston capital, has taken a bond and lease on the Buffalo Consolidated claims.

Work is being done in the Buffalo tunnel, which is being driven to cut the Chloride Point vein at 250 ft. greater depth than heretofore opened. The Chloride Point oreshoot was practically continuous for 1100 ft. The ore carries silver with some gold. Work will also be started in the tunnel on the Northern Light claim. An air line is being put in from the Ophir Hill compressor to the Buffalo tunnel, and a building will be erected at the portal. Machine drills and track have been purchased.

Cliff—Secretary and treasurer A. L. Kern, of Milwaukee, made a visit of inspection to the property, Oct. 20. The regular output of 70 tons daily is being maintained. Milwaukee people are largely interested.

Ophir Hill—Water which is being pumped from the inclined shaft will be used in the mill. A pipe line has been laid. The water supply in the cañon is lower than usual.

Dry Cañon—This company is shipping 40 to 50 tons of silver-lead ore a month from its lease on the Kearsarge mine. The ore carries \$7 in gold and brings from \$35 to \$40 per ton. It occurs where north-south mineralizing fissures cut a bed of silicious limestone.

Hidden Treasure—Work is being done in the 2700-ft. tunnel, and some ore is being mined.

Mona—Control of this property has been taken over by Pittsburg interests. The mine is one of the old-time producers.

UTAH COUNTY

Mountain Dell—Enough ore is being shipped to cover development. Three cars have been shipped during the past two months, and another car is on the market. Four feet of good silver-lead ore was recently encountered, and is being followed. As broken down it carries around 35 per cent. lead, 75 oz. silver, 2 per cent. copper, and some gold. Development will be kept up during the winter.

Miller—This property adjoins the Mountain Dell on the northwest, and is one of the oldest in the district, having been worked as early as 1868. It is accredited with a large production. A car of silver-lead ore has been shipped by leasers. Beside silver and lead ore the ore carries around \$10 gold per ton. Approximately half of the property has been developed.

Eudora Bell—Power drills are being used. Air is obtained from the Mineral Flat Company.

Lost Josephine—Work on this company's claims has been closed for the season. The tunnel is in 140 feet.

Pacific—A large tonnage of low-grade ore is claimed to have been developed on this property in American Fork cañon. There are two tunnels 800 and 300 ft.

in length, from which an aggregate of 1400 ft. of drifting has been done. The property consists of nine claims near the Mountain Dell. J. O. Craig is president.

Washington

SNOHOMISH COUNTY

Nonpareil—This company is considering the erection of a smeltery at its mine near Everett.

New Republic—The holdings of this company have been transferred to A. L. Bradley, of the Rathbon Reduction Works, Republic. This property includes the old Republic mine and other claims.

Princess Maud and Ore-Or-No-Go—These claims have been sold to W. W. Gifford and C. W. Butterfield, of Spokane, and a company is to be formed known as the Princess Republic Company.

North Washington Power and Reduction Company—This company will install a large cyanide plant for the reduction of the ores from the mines in the Republic district. L. M. Anderson, Republic, is president.

Canada

BRITISH COLUMBIA

Attention is being attracted to a mining field recently discovered in the southern part of Yale mining division. It is distant from Hope, on the Fraser river, about 40 miles, the trail from Hope crossing the main Cascade range and passing thence down the Sumallow river to the Skagit, the mineralized belt being in the vicinity of the latter stream, along its course for about six miles northeast from the International Boundary. The formation is stated to be andesite with intrusive sheets of quartz porphyry, the latter containing visible free gold. Specimen assays have given returns ranging from \$15 to \$200 in gold per ton. The district is not difficult of access, but with the winter coming on the snow will prevent surface prospecting. Claimholders and others interested are combining to secure the early construction of a wagon road. A townsite has been surveyed and hotel and store buildings are being erected. The center of activity is on Steamboat mountain, on and about which numerous mineral claims have been staked.

Yankee Girl—A compressor has been received at Ymir for this mine, which is shipping gold-silver ore of the Consolidated smeltery, at Trail.

Rawhide—Shipment of ore has been resumed, at the rate of about 200 tons a day. By arrangement ore is going to British Columbia smeltery, at Greenwood.

Mayflower—On this property, in the South Belt district, under lease to N. Hanson, two veins have been opened.

Beatrice—It is reported that this mine

in the Lardeau district will reopen. Harry Anderson, of Nelson, is one of the principal stockholders.

California—This mine, on Toad mountain, is being worked by J. P. Bell.

Standard—This property, near Silverton, will retain a large force during the winter. The ore is shipped to Trail.

Tyee—During September 7600 tons of ore, valued at \$89,000, were treated.

NEW BRUNSWICK

A syndicate represented by Sir W. C. Van Horne has bought the property formerly owned by the Albert Coal and Railway Company about 25 miles from Moncton. A company is being organized in London to work the deposits of oil shale there, on a large scale. The deposits have been examined by Canadian and English experts, and a special report on the oil shales was made last year by Dr. Heindich Ries.

NOVA SCOTIA

Canada Paint Company—This Montreal company is putting in machinery and preparing to work the barytes mine at Memramcook in Westmoreland county. J. Bradley is manager.

ONTARIO

Shipments from Cobalt for the week ended Oct. 22 were: Buffalo, 52,430 lb.; Cobalt Townsite, 64,000; Coniagas, 62,540; Hargraves, 42,300; Kerr Lake, 387,700; La Rose, 184,740; McKinley-Darragh, 174,510; Nipissing, 309,310; Right of Way, 62,270; Temiskaming, 141,870; total, 1,481,670 pounds.

According to the report of the Bureau of Mines for 1909, which has lately been issued, four mining companies paid to the Ontario Government in ore royalties the sum of \$338,426 approximately \$37,000 more is due but the time for payment did not fall within the fiscal year. This royalty is also exclusive of the amounts paid by the Right-of-Way and City of Cobalt mines, to the Temiskaming & Northern Ontario Railway commission to Oct. 31, 1909, the O'Brien, Crown Reserve, Temiskaming & Hudson Bay and Chambers-Ferland mines paid in royalties \$779,443, the former being much the largest contributor, having paid \$474,357. The sale of lands in the Gillies Limit, was also a source of considerable revenue to the Government. In all there were four sales and 1671.71 acres were disposed of, bringing in \$711,453, including the price paid for the Provincial mine. These lots were sold on condition that 10 per cent. of the gross proceeds from ore sales, less freight and treatment charges, should be paid as royalty.

The Walker-Hennessy-Davidson-Carson properties in Porcupine, have been optioned for short term by New York and English capitalists. The price is stated to be \$150,000.

Northern Customs Concentrator—The foundations are being laid for the in-

stallation of an addition of 20 stamps, to enable the company to handle the output of the Townsite mine, with which a contract has been made for 50 tons of ore per day. The present capacity of the mill is 150 tons per day, which is all required for treating the ores of the City of Cobalt and La Rose mines.

La Rose—President D. Lorne McGibbon confirms the report of the discovery of a rich vein running parallel to the main vein at the 170-ft. level. He states that the vein has been cut at eight points on the 157-ft. level, and also at the 62-ft. level. The vein has been opened up for 300 ft. and appears to average about 4 to 5 in. in width, the ore assaying nearly 4000 oz. to the ton. Mr. McGibbon also confirmed the later statement of an important strike of ore on the Lawson property, at the 188-ft. level.

Bishop—The work done on this mine, at Gowganda, includes 25,000 ft. of stripping and 1000 ft. of shaft work, the deepest shaft being 132 ft., proving the continuance of ore at that depth. There are two 50-h.p. plants in operation, and an additional 100-h.p. plant has been ordered. As the freight rate to Latchford is \$47 per ton, the ore is all being stored.

Lucky Godfrey—This Elk Lake mine has been closed down for want of funds, pending a reorganization.

Wettlaufer—This South Lorrain mine has a pay shoot 126 ft. long at the 220-ft. level, and the face of the drift is in 4 in. of high-grade ore.

North Davidson—This Porcupine group of five claims in the northeast of Tisdale township, which were formerly under option to M. J. O'Brien for \$130,000, have been sold to a New York syndicate. The purchase price is stated at \$150,000.

Bailey—High-grade ore has been encountered on the 230-ft. level of this Cobalt property. Arrangements have been made with the Cobalt Central, to concentrate part of the Bailey ore.

Gold Consolidated—At this Cobalt mine a vein carrying high silver has been struck at the 300-ft. level by diamond drilling. A shaft will be put down.

Drummond—This Cobalt property is resuming work and will sink a shaft to catch the Hargraves vein.

Buffalo—The mill report for September shows that there were treated 3718 tons, assaying 28.35 oz. per ton from which was recovered 82,639 oz. of silver. Total milling expenses, \$4864.

YUKON TERRITORY

A. N. C. Treadgold is enlarging his operations by the construction of a large ditch from near the mouth of Rock creek, down the left limit of the Klondike river to the mouth of the Hunker. Harry Boardman has charge.

Mexico CHIHUAHUA

The Alvarado Consolidated Mines Company and the Palmilla Mining Company, both of Parral, will be consolidated into a \$5,000,000 company. Both companies were financed from Boston.

Descubridora—It is reported that operations will be resumed at this mine near Chihuahua. It is a producer of desirable silicious ore carrying gold and silver.

Sierra Plata—This mine in the Villa Escobedo section is now producing at the rate of about 60 tons daily, the product going to Chihuahua.

Resolana—The Penoles company is mining an increased tonnage from this Parral property, the product going to Mapimi.

DURANGO

Lustre—This company's property was sold, December, 1909, at public sale, and purchased by the creditors. The creditors and former stockholders have formed a new organization, the full details of which will appear later, and arrangements are being made to resume work immediately. The new company will be organized with a capital of \$2,500,000, not over \$1,425,000 of which will be issued under the present arrangement. The company will have an authorized issue of 400,000 collateral income bonds, not over \$310,000 of which will be issued under the present arrangement, leaving 90,000 bonds and 1,175,000 shares of stock in the treasury. The company is free of debt and starts with \$125,000 cash.

Tominil—This British company which has been developing a silver-gold vein near the Durango-Sinaloa line for nearly a decade will reorganize according to London advices and continue operations.

Inde Reduction Company—This property has recently changed ownership and the new owners will immediately put the smelting plant in commission.

Bacis—This gold-silver property near San Dimas has resumed. It has a mill.

GUERRERO

Trinidad—A company of this name has been incorporated at Indianapolis, Ind., capital \$125,000, to operate gold-silver mines in Guerrero. Henry Jameson, F. O. Dorsey and L. W. Hay are the incorporators.

HIDALGO

Compañia Beneficiadora de Metales de Atotonilco el Chico—This company has been organized to build a cyanide mill in El Chico. The company has contracts for ore for 10 years. Following are the officers. J. P. Warr, president; P. L. Rodriguez, first vocal; T. P. Honey, second vocal; S. Ludlow, third vocal; R. N. Rabling, comisario; G. Gonzalez, secretary.

JALISCO

Magistral-Ameca—As the result of a deal just made, French interests, now

identified with Mexican mining enterprises, acquire a large stockholding in the Magistral Ameca Copper Company, of Los Angeles, owning the Magistral copper mine and reduction plant in the Ameca district. The deal will result in a fund of about 200,000 pesos after the payment of all indebtedness. The company has discarded the Elmore flotation process and jigs, and is now treating its ores by concentrating on Wilfley tables, regrinding middlings and tailings in a tube mill and running the product over slime tables. The tonnage handled has been low, due to screen troubles resulting from acid and the extreme hardness of the ore. Several classes of screens have been ordered for tests. From an average of 36 tons daily the company has been shipping 7 tons of concentrates. It is proposed to remodel the plant to some extent and install six additional sand and four slime tables. The tonnage will be brought up to 150 tons daily.

Mirador Mining Company—This company, owning the Mercedes-Providencia group in the Hostotipaquillo district, and the San Francisco group across the Santiago river in Tepic, will build a 100-ton reduction plant during the coming year. The plant will be at the Mercedes-Providencia. Shipments of sorted ore from this group run 3000 grams silver and 15 grams gold.

MEXICO

Esperanza—For September the mill crushed 19,101 tons and the total receipts were \$145,047, and net profits \$36,238.

MICHOACAN

A new gold camp is being developed at Pomoca and San Miguel El Alto, northwest of El Oro. The San Vidal company, Mexico City, is the principal operator.

OAXACA

San Fernando—A Quincy, Ill., company will develop these lead-silver properties, about 43 miles southwest of San Fernando. J. W. Gardner is president.

SINALOA

The exclusive concession for smelting in Sinaloa granted to A. H. McKay and associates has been acquired by the Pacific Smelting and Mining Company of New York, which company already owns the plants at Fundicion and Guaymas in Sonora.

SONORA

Greene-Cananea—A mixing bed, with automatic assimilators and belt conveyers, is being installed to mix and feed concentrates for the roasting plant.

Nacozari Consolidated—Work on the adit tunnel, which was expected to reach the shaft by Jan. 1, has stopped, pending the sale of 5000 shares of stock to meet the expenditure.

El Tigre—Surveys for the transmission line, connecting the mines and works with the power plant of the Copper Queen

Company, at Douglas, have been completed.

Calumet & Sonora—The directors of this company have appointed Dwight E. Woodbridge general manager, vice J. W. Norton, resigned.

North Tigre—A tunnel, for prospecting purposes, is being driven.

La Antigua—Two cars of silver ore are shipped weekly from this mine by H. C. Carr, lessee.

Elenita—This company, owning ground south of Cananea, and chiefly owned by L. W. Powell, has sunk its initial shaft to 180 feet.

Mina Mexico—W. E. Pomeroy, operator of this mine, is grading a wagon road from the property to Tonichi, and is planning to build a small smeltery.

Trinidad—The properties of this company, in the Sahuaripa district, are being negotiated for by A. B. Fall and associates, with arrangements for a resumption, if the deal matures.

TEPIC

Santa Virginia Mine and Milling Company—This company organized in San Antonio, Tex., capital \$50,000, has taken over the Santa Virginia, La Plomosa and Mariposa silver-gold mines in the Amatlan de Cañas district, owned for several years by J. B. Mulhall and R. C. Hawley, who retain a large interest. Orders have been placed in San Francisco for five stamps, conical mill, concentrators and cyanide equipment. The Santa Virginia has been extensively developed.

Pan-American—Development of the San Antonio and other properties in the Amatlan de Cañas district has progressed to such a stage that a concentrating plant is proposed. Bankers of Gulfport, Miss., are principally interested. E. M. Browder is in charge.

El Dorado—This Mexico City company is not now operating at its properties in the Amatlan de Cañas district. A 10-ton hot blast furnace, erected several months ago, was shut down after a short period of operation.

Castellana Consolidated—This English concern expects to dispose of its holding in Tepic, consisting of 16 mines and a concentrating and cyaniding plant. The mines include the Castellana, worked by the company for a number of years, and the Guanajuatillo, a former rich producer, unwatered after operations in the Castellana were suspended. It was found that much additional development would be necessary in the Guanajuatillo, and the directors voted against providing additional capital.

ZACATECAS

Zacatecas Mining and Metallurgical—Electrical equipment for the concentrating and cyaniding plant has arrived from Germany and is being installed. The plant will be soon in operation.

THE MARKETS

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

Coal Trade Review

New York, Nov. 2—Coal trade in the West continues active, mines being generally well employed, with plenty of orders. Prices are strong. The fear of a coal famine at large consuming points has passed away. The great question at present is car supply, and that is making a good deal of trouble. Cars are short on many lines, and coal operators are held up on pressing orders. The complaint is widely spread, and the railroads are coming in for a great deal of blame.

In the East both anthracite and bituminous trades are in good shape and active. There is some trouble with car supply, but conditions in this respect are much better than in the West. The greatest shortage of cars is in the West Virginia trade.

Southern Coal Rates—The Interstate Commerce Commission is investigating charges made by the Black Mountain Coal Lands Company, the Victor Manufacturing Company, the Southern Appalachian Coal Operators' Association and the Alabama Coal Operators' Association against certain railroads in the South. The charges are that the coal rates as made by the railroads are intended to discriminate against certain mines and to limit the territory where they can sell coal.

Illinois Miners' Qualification Act—A test case under this act is to be heard by the Illinois Supreme Court at its fall term, on an appeal from Saline county. The constitutionality of the law is contested on several grounds. The act, the operators claim, makes it impossible to import men from out of the State or to employ nonunion men in the mines. It provides that no one can work in a mine in Illinois unless he passes an examination before a board appointed by the county judge in each county. These examiners are invariably union men, and, naturally, they will recognize only union miners as qualified to mine coal.

COAL TRAFFIC NOTES

The total shipments of West Virginia coal for the fiscal year ended June 30 are reported as follows: Norfolk & Western district, 19,032,323; New River and Kanawha, 18,490,649; Monongahela, 11,616,974; Potomac, 2,156,538; Wheeling, 1,237,953; interior, small mines, 189,271; total, 52,723,708 long tons. The largest shipper was the Consolidation Coal Company, with 5,008,680; the sec-

ond was the United States Coal and Coke Company, with 2,560,262 tons.

Norfolk & Western coal tonnage three months of the fiscal year from July 1 to Sept. 30, short tons:

Field:	Com- mercial.	Com- pany.	Total.
Pocahontas.....	2,783,288	238,882	3,022,170
Tug River.....	385,648	108,804	494,452
Thacker.....	408,625	144,145	552,770
Kenova.....	176,583	39,596	216,179
Clinch Valley.....	127,589	10,042	137,631
Total.....	3,881,733	541,469	4,423,202

The total for the corresponding period in 1909 was 4,014,530 tons; showing an increase this year of 408,672 tons, or 10.2 per cent.

Coal shipments reported by Pittsburg Coal Company, nine months ended Sept. 30, short tons:

	1909.	1910.	Changes.
Pittsburg district.	9,718,344	11,470,112	I. 1,751,768
Hocking district...	681,455	909,875	I. 228,420
Total.....	10,399,799	12,379,987	I. 1,980,188
Coke.....	344,079	459,930	I. 115,851

Increase in coal this year, 19 per cent.; increase in coke, 33.7 per cent.

New York

ANTHRACITE

Nov. 2—There is little change in the local trade, though deliveries are improving. The collieries generally are working longer time than they have been for two months past.

Schedule prices for large sizes are \$4.75 for broken and \$5 for egg, stove and chestnut, f.o.b. New York harbor. For steam sizes, current quotations are: Pea, \$2.95@3.25; buckwheat, \$1.15@2.50; No. 2 buckwheat, or rice, \$1.65@2; barley, \$1.35@1.50; all according to quality, f.o.b. New York harbor.

BITUMINOUS

The market holds up well. The West is still taking some coal, chiefly gas coal, from Eastern territory, and seaboard orders are good. All-rail trade is also in good shape.

Prices are well held. Gas coals are selling at tide at prices which realize \$1.05@1.10 at mine for ¾-in., 95c.@\$1 for run-of-mine and 70c. for slack. Low-volatile steam coals bring \$2.70@2.75, New York harbor, for the lower grades, and up to \$2.90@\$3 for better qualities.

Car supply is getting to be quite a serious question on some roads, and there is more or less complaint all around. Transportation is up to the mark when the cars are once loaded.

In the coastwise vessel market there is no change, but rates are firmly held. From Philadelphia charters continue on the basis of 70@75c. to Boston or Port-

land. From New York 60c. is quoted to points around Cape Cod; 30@35c. to Sound ports.

Birmingham

Nov. 1—Coal operations are very active in Southern territory. The production is only limited by the railroad capacity, a car shortage being reported from several parts of the State. Some of the railroad lines in this district are offering to handle all business that will not require cars to leave the home territory; in other words, the railroads are afraid to allow their cars to get away from the initial line. Good prices obtain. The New Orleans, Pensacola and Mobile demands are increasing steadily. The operators in this State are doing the best they can. In all directions the mines are being worked steadily and labor is being added. The decided change in weather conditions has brought about a better demand for domestic coal.

Coke is in steady demand and those in a position to sell on the open market are meeting with good trade.

Chicago

Nov. 1—The weather has continued cool and domestic trade has been brisk accordingly, while the demand for steam coal is steady. Supplies of Western coal are good, while those of Eastern are smaller, chiefly owing to the shortage of cars, which is getting to be quite a serious question. The railroads are beginning to look after their equipment closely and are charging up demurrage pretty sharply, so that there is less probability of oversupply.

Prices are practically unchanged. Illinois and Indiana lump brings in car lots \$2.10@3; run-of-mine, \$1.85@2.05, and screenings \$1.25@1.55. Hocking is steadiest and strongest of coals from east of Indiana, bringing \$3.40. Smokeless sells for run-of-mine at \$3.30, while lump brings \$3.95@4.15. The anthracite trade is good, owing to the weather in both city and country.

Cleveland

Oct. 31—Shipments up the Lakes continue good, and plenty of vessels are to be had. The railroads have done well in carrying coal from the upper ports, and there is plenty of dock room there. Local trade is active. Car shortage is beginning to be quite a feature, especially from West Virginia.

Middle district coal, f.o.b. Cleveland, brings \$2.15 for 1¼-in., \$1.90 for ¾-in.,

\$1.80 for run-of-mine and \$1.50@1.55 for slack, No. 8 and Cambridge 5c. higher. Pocahontas is scarce on account of car shortage, and brings \$3.40 for lump and \$2.60@2.70 for run-of-mine.

Indianapolis

Nov. 1—The coal-car famine at the mines is so serious that the coal operators of Indiana propose holding a meeting at Terre Haute to see if some method of relief cannot be devised. One trouble, it seems, is that the coal-carrying roads operating in Indiana have permitted large numbers of their cars to be scattered over the country. The State Railroad Commission has been consulted in regard to the difficulty of obtaining cars. The chairman of the commission said they have had no complaints of discrimination against any of the coal producers, but a large number of complaints had been received of inability to get cars. A number of mines in the State were reported idle during the past week for the lack of cars. One reason given for the shortage of cars is that a railroad is compelled to pay only 25c. a day for a car belonging to another company. Some roads have found it cheaper to pay the nominal sum than to build cars.

The proposed increase on coal rates north from Indiana fields, affecting the north half of the State, will not be placed in effect until Dec. 1, according to advices received by the Indiana commission. An effort is being made to postpone the Indiana increase until Feb. 1. Prices at the mines are stiff and orders are piling up.

Pittsburg

Nov. 1—Shipments in the Lake trade have been dwindling rapidly, and the movement this month will be very light. Local demand is unchanged. Subject to occasional shading, market prices continue quotable at \$1.20@1.22½ for run-of-mine and nut, \$1.30@1.32½ for ¾-in., \$1.45@1.47½ for 1¼-in., and 75@82½c. for slack, per ton.

Connellsville Coke—The report mentioned in last letter that \$1.75 had been done on furnace coke for first half is confirmed, the transaction having been that of a furnace interest covering its requirements for November and December at \$1.55, and a portion of its first-half requirements at \$1.75. Reports are being circulated of coke at \$1.90 for first half, specific instances named being a contract closed for 10,000 tons monthly and one under negotiation, lacking only the arrangement of a minor detail, for 15,000 tons monthly. These reports are not absolutely confirmed and savor of efforts very common at this time of year to get consumers interested. There have been several scale contracts lately closed, and there is not much difficulty in putting such business through, the ratio being 7½ to 1 on basic iron, which

at the present market of \$13, Valley, for basic iron works out \$1.73 for the coke. We quote market prices substantially unchanged: Prompt furnace, \$1.55@1.60; contract furnace, \$1.75@1.90; prompt foundry, \$2@2.12; contract, \$2.25@2.50. Occasional lots of demurrage coke have been sold at less than \$1.55, and sometimes down to \$1.45, at ovens.

The *Courier* reports the production in the Connellsville and lower Connellsville region in the week ended Oct. 22 at 351,085 tons, a decrease of 1000 tons, and shipments at 3653 cars to Pittsburg, 5471 cars to points west and 840 cars to points east, a total of 9964 cars.

St. Louis

Oct. 31—The weather for the last three or four days has been very brisk and as a consequence retail dealers have been paralyzed with business this week. Owing to the strike and high prices, everyone held off buying coal during the summer months and, in fact, a very small tonnage of domestic coal had moved prior to Oct. 1. As a consequence the buying public all want to get their coal in at the same time, which has resulted in an unusual congestion. This, of course, reacts on the market and high-grade coal of all kinds is in excellent demand at good prices even in spite of the rigid car restrictions.

Current prices on the St. Louis market are as follows:

	Mine.	St. Louis
Illinois, Standard:		
6-in. lump and egg.....	\$1.60	\$2.12
2-in. lump.....	1.20	1.60
Mine-run.....	1.00	1.52
Screenings.....	0.50	1.02
Trenton:		
6-in. lump and egg.....	2.50	3.02
3-in. nut.....	2.00	2.52
Staunton or Mt. Olive:		
6-in. lump.....	1.80	1.32
2-in. lump.....	1.75	2.27
Mine-run.....	1.20	1.72
Screenings.....	0.60	1.12
Carterville:		
6-in. lump or egg.....	2.00	2.67
3-in. nut.....	2.00	2.67
Mine-run.....	1.25	1.92
Screenings.....	0.75	1.42
Pocahontas and New River:		
Lump or egg.....	2.25	4.75
Mine-run.....	1.25	3.75
Pennsylvania Anthracite:		
Nut, stove or egg.....	.....	6.95
Grate.....	.....	6.70
Arkansas Anthracite:		
Egg or Grate.....	2.35	5.35
Coke:		
Connellsville foundry.....	.....	5.40
Gas house.....	.....	4.90
Smithing.....	.....	4.15

Prices at East St. Louis are 20c. per ton below St. Louis quotations.

On the other hand, there is a large tonnage of low-grade coal, which is not generally favored for domestic use, which has gone down practically to the cost of production owing to the fact that the railways' car restrictions are so rigid that operators are absolutely unable to find a market. The railroads are refusing to let their cars go to points where they have through rates and are thereby violating a very definite ruling of the Inter-

state Commerce Commission. However, they figure they are safe in this business as operators on their lines would be afraid to attempt to force them on an issue of this kind and no one else cares to take the trouble to put the matter to a test; consequently, while the railroads know they are in the wrong, they continue to keep up the restrictions in every instance. It is certain that operators in the Belleville district have suffered a heavy loss on account of these restrictions as it has forced the price of their product down at least 50c. per ton, at the only time of the year when they can expect to get a good profit on their coal.

Anthracite—The demand for anthracite has been very good and a large tonnage has been moving to both city and country trade. Local dealers have about depleted their early stocks and are ordering freely to replenish.

FOREIGN COAL TRADE

Belgian Coal Trade—Imports and exports of fuel in Belgium, nine months ended Sept. 30, metric tons:

	Imports.	Exports.	Excess.
Coal.....	4,725,638	3,627,424	Imp. 1,098,214
Coke.....	369,107	793,490	Exp. 424,383
Briquets.....	199,287	413,940	Exp. 214,653
Total.....	5,294,032	4,834,854	Imp. 459,178
Total, 1909....	4,623,967	4,968,495	Exp. 344,528

Exports are chiefly to France; imports are principally from Germany.

Welsh Coal Trade—Messrs. Hull, Blythe & Co., London and Cardiff, report prices of coal as follows on Oct. 22: Best Welsh steam coal, \$3.90; seconds, \$3.66; thirds, \$3.48; dry coals, \$3.60; best Monmouthshire, \$3.48; seconds, \$3.30; best steam smalls, \$1.98; seconds, \$1.74. All prices are per long ton, f.o.b. shipping port, less 2½ per cent. discount.

IRON TRADE REVIEW

New York, Nov. 2—The iron and steel markets continue to show a good volume of current business, but very little in the way of orders or contracts running far ahead. It is still a waiting market so far as business for next year is concerned.

In pig iron there have been more sales of foundry, some of fair size, both in seaboard territory and in the Central West. Some basic has been sold also. Foundry iron is in stronger position than basic or bessemer, as accumulated stocks are believed to be less. Moreover foundry yards are generally very low in stocks, but the policy seems to be still to limit orders to present requirements. Makers are beginning to give way and many are willing to take current prices on first-quarter deliveries, though they hesitate to go beyond that.

In finished material there has been some business in plates and bars; some large and a number of small orders for

structural steel. Some orders for steel cars are noted, with inquiries for more. Business in pipe is good also. Jobbing trade in bars, pipe and other small material is good.

Lake Superior Iron Ore—Everything points to a light November movement of iron ore from Lake Superior. A considerable part of the Lake fleet is already laid up, and the movement from mines to the shipping docks is reported light. Many mines are closing down and preparing for winter, this being especially the case with the open-pit mines. Some of the mines still working are putting their ore into stock piles. It is understood, however, that the usual amount of prospecting and development work will be carried on during the winter.

Baltimore

Oct. 31—Exports for the week included 681,500 lb. spelter and 3,425,200 lb. steel billets to Liverpool. Imports included 635 tons ferromanganese from Antwerp; 250 tons silicospiegel from Middlesboro, England; 6600 tons iron ore from Bombay, India; 20,600 tons iron ore from Cuba.

Birmingham

Nov. 1—While the pig-iron market is still quiet there is a better feeling prevailing by reason of the fact that a number of orders for iron are being handled, mostly for immediate delivery, and a strong inquiry is coming in for the future. Prices have stiffened in the last few days to \$11.50 per ton No. 2 foundry. The manufacturers say there is no more \$11 iron to be obtained, the lowest price now heard of being \$11.25, and that is for delivery within the fortnight. There is no iron selling for the first quarter of 1911 under \$11.50 per ton.

Accumulated stocks of iron in Southern territory will not show much reduction when an inventory is taken. There was a considerable amount of iron to go to the yards during the last week of October. The railroads are giving good service in handling pig iron so that consumers who are buying for immediate needs can be accommodated. A prominent furnace master, in speaking of conditions, states that it is positively known that the consumers have not yet prepared for actual needs next year and that with the least improvement there will be need for a large amount of iron.

There is still some activity in steel and the plant of the Tennessee company, at Ensley, keeps in operation.

Charcoal iron holds its price at \$22 per ton, but there is no big demand.

Chicago

Nov. 1—There is very little change in the iron market, and melters seem to be adhering to their policy of buying for immediate needs. Some business, however, is being done for first quarter, and

plenty of inquiries for first-half business are coming. The volume of small orders is large, and seems to be mounting up. There is no change in prices, which remain as last week on No. 2 foundry, \$11@11.50, Birmingham, or \$15.35@15.85, Chicago, for Southern, and \$16@16.50 for Northern. For first-half deliveries 25@50c. over these quotations is demanded.

Iron and steel products are selling a little better and the market remains firm. Coke is fairly active, in good supply, and firm at \$4.90 for the best Connellsville.

Cleveland

Oct. 31—Iron ore movement is gradually slowing off, and the October total is expected to be light.

Pig Iron—Local business is confined to small orders, but there are some inquiries from outside, especially for basic pig. Quotations continue for Cleveland delivery at \$15.65@15.90 for bessemer; \$14@14.25 for No. 2 foundry; \$13.75@14 for gray forge; \$18@18.50 for Lake Superior charcoal.

Finished Material—The business this week is summed up in some good orders for bars, a few bridge orders, and some fair sales of spikes and other track material. Inquiries are in for some structural steel and for plates, but no contracts closed.

Philadelphia

Nov. 2—The pivot around which a great deal of business hangs fire is price. The bulk of this business relates to forward delivery, some of it covering the first three months and some the second quarter. Pig-iron consumers here and elsewhere know that a resumption of ordering by railroads on a large scale would affect quotations of pig iron except in those cases where options are out. Pig-iron buyers are, therefore, more on the alert on account of this possible railroad buying movement, especially the large users of foundry and basic pig. The only indication of renewed interest this week is shown in inquiries and some propositions to buy iron for next quarter's delivery. Makers of iron show a determination to hold on and no concessions were offered though there are rumors that cannot be traced up that some Pennsylvania furnaces have cut prices on No. 2 foundry. Quotations for No. 2 X, \$16; basic, \$15; forge, \$14.50 per ton.

Steel Billets—Deliveries on old orders are being made and new business is trifling in forging billets.

Bars—Bars are dull in both common and refined. Jobbers and storekeepers are fully supplied.

Sheets—Supplies of sheet among the distributors are rather large for the season and the mills report a slack week in orders. While card rates are maintained shadings could probably be had.

Pipes and Tubes—Merchant pipe is flat, with scarcely any sales. Cast-pipe foundries are running to capacity although two or three are in sight of the end of some big contracts.

Plates—So far as new business goes the orders are insignificant and some negotiations opened a month ago in a tentative way have terminated with no prospects for business. Moderate sales of marine steel and tank are reported frequently.

Structural Material—The only orders reported are for 100-ton lots and less for this territory and in New England.

Scrap—After a little activity in scrap, dealers report a dull week in all lines with more scrap offering than can find ready market.

Pittsburg

Nov. 1—The placing of orders by the Delaware & Lackawanna for 1000 all-steel and steel underframed cars, and reports that the Pennsylvania system is about to place some extensive car orders, as well as its order for rails for next season, are giving rise to an impression that the railroads may not entirely defer purchases until after the question of freight-rate advances has been adjudged by the Interstate Commerce Commission. The steel trade had not been expecting any railroad purchases until February, the commission having suspended rate advances until Feb. 1, but was looking for a large accumulation of business to be let out at that time. It is suggested that some of the railroads may realize that there would be danger of a congestion then and may buy earlier, particularly since they ought to be able to buy at very attractive prices at this time as the steel-car companies in particular have scarcely anything to do. One leading interest is understood to have enough business to run it at half capacity into February, while practically all the others have no freight-car business on books worth mentioning.

Business in wire nails and sheets continues good, and very close to mill capacity, while in the heavy lines business continues light and as old orders play out mills are running at a slower gait. On account of the close of the canning season and orders being slow because last winter's price is maintained, tinplate production is being reduced. Reports are that the American Sheet & Tin Plate Company is this week closing eight mills at Martins Ferry, 16 at New Kensington, 10 at South Sharon and 30 at New Castle, a total of 66 of the 210 tin mills it has been operating, with a few more to close later. Production so far this year has been extremely heavy and reduced production in the closing months would not be abnormal.

Pig Iron—The Union Steel Casting Company has bought 1500 tons of besse-

mer iron for equal deliveries over the first half of next year at the prevailing price of \$15, Valley, or \$15.90, delivered Pittsburg. Thus in bessemer there is no premium on forward delivery, and on other grades the tendency to premiums is decreasing, foundry iron commanding not over 25c. premium for first quarter. Reports are being circulated that sellers have refused bids of \$13, Valley, for basic iron and that the market has advanced to \$13.25 or higher, but investigation indicates that the bids came from middlemen, to whom the furnaces do not care to sell, and that basic iron can still be had, for early delivery, at \$13, Valley. Foundry iron has sold at \$13.75, Valley furnace, for fourth quarter, and at \$14.50, delivered Pittsburg, by a furnace having an 85c. rate, this being to meet a similar delivered price made by a furnace having a 75c. rate to Pittsburg, the Valley rate being 90c. The market is fairly quotable at \$13.75@14, Valley, or \$14.65@14.90, Pittsburg, for prompt delivery or deliveries running just into the new year. Malleable is quotable at \$13.50, Valley.

The bessemer and basic pig-iron averages for October were \$15 and \$13.15, respectively, Valley furnaces, representing declines from September of 2c. in bessemer and 68c. in basic. The high points within a year were \$19 for bessemer, in November, December and January, and \$17.48 for basic, in November.

Ferromanganese—The market is slightly firmer, and prompt can be quoted at \$38.75, Baltimore, against \$38.50 hitherto. A sale of about 1000 tons for first half has been made at \$39, Baltimore, which can be quoted as the market for forward deliveries.

Steel—The market has been quiet and by no means firm, as some offerings are reported at slightly below last week's reduced quotations. In the absence of any definite business those quotations are repeated: Bessemer billets, \$23.50; sheet bars, \$24.50@25; open-hearth billets, \$24.50@25; sheet bars, \$25@25.50; rods, \$28.50@29 per ton, Pittsburg.

FOREIGN IRON TRADE

British Foreign Trade—Exports and imports of iron and of machinery in Great Britain, nine months ended Sept. 30, are valued by the Board of Trade returns as below:

	Exports.	Imports.	Excess.
Iron and steel	\$22,313,057	£ 6,654,064	Ex. £25,658,993
Cutlery and hardware	4,040,047	918,544	Ex. 3,121,503
Machinery	21,534,517	3,343,302	Ex. 18,191,215
New ships	7,575,061		Ex. 7,575,061
Total	£65,462,682	£10,915,910	Ex. £54,546,772
Total, 1909	57,481,561	10,207,296	Ex. 47,274,265

Increase in exports this year £7,981,121, or 13.9 per cent.; increase in imports, £708,614, or 6.9 per cent. The total quantities of iron and steel were, in long tons:

	1909.	1910.	Changes.
Exports	3,192,304	3,554,633	I. 362,329
Imports	897,180	1,022,842	I. 125,662

The imports were largely of crude or semi-finished material, as pig iron, billets and blooms.

British Iron Ore Imports—Imports of iron ore into Great Britain, nine months ended Sept. 30, were 4,572,874 tons in 1909, and 5,322,245 in 1910; an increase of 749,371 tons. Of the imports this year 3,650,213 tons were from Spain.

German Iron Production—The German Iron and Steel Union reports the make of pig iron in Germany in September at 1,232,477 metric tons, or 30,327 tons less than in August. For the nine months ended Sept. 30 the production was, in metric tons:

	1909.	1910.	Changes.
Foundry iron	1,804,190	2,149,237	I. 345,047
Forge iron	504,503	486,853	D. 17,650
Steel pig	810,818	1,001,281	I. 190,463
Bessemer pig	307,435	362,734	I. 55,299
Thomas(basic)pig	6,082,091	6,925,524	I. 843,433
Total	9,509,037	10,925,629	I. 1,416,592

The total increase this year was 14.9 per cent. Steel pig includes spiegeleisen, ferromanganese, ferrosilicon and all similar alloys.

METAL MARKETS

New York, Nov. 2—The metal markets have been comparatively quiet on most lines. Price movements have been irregular, but generally show an upward tendency.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal.	Exports.	Imports.	Excess.
Gold:			
Sept. 1910	\$1,822,476	\$ 3,481,718	Imp. \$ 1,659,242
" 1909	7,546,442	2,351,158	Exp. 5,195,284
Year 1910	55,318,081	45,971,504	" 9,346,577
" 1909	97,272,834	31,106,393	" 66,167,441
Silver:			
Sept. 1910	4,830,346	3,152,117	Exp. 1,678,229
" 1909	4,385,532	3,261,397	" 1,124,135
Year 1910	41,764,743	32,967,887	" 8,796,856
" 1909	43,289,116	33,240,530	" 10,048,586

Exports from the port of New York, week ended Oct. 29: Gold, \$128,700, chiefly to Panama; silver, \$600,118, to London and Paris. Imports: Gold, \$107,018, from Japan, Central and South America; silver, \$120,447, from Mexico and South America.

Gold—Prices of gold on the open market in London were unchanged at 77s. 9d. per oz. for bars and 76s. 5d. per oz. for American coin. The Bank of England took most of the supplies arriving. In New York some gold was taken for Canada.

Platinum—Demand continues strong, and advices from abroad show a rising tendency there. Prices have again advanced and dealers ask \$38.75@39.25 per oz. for refined platinum; \$44@44.50 per oz. for hard metal.

Silver—Silver is quiet but steady. From present appearances the range of

fluctuations for a time at least, will be within a small compass.

SILVER AND STERLING EXCHANGE						
Oct.-Nov.	27	28	29	31	1	2
New York	56½	55¾	55¾	56	56	56
London	25¾	25½	26½	25½	25½	25½
Sterling Ex.	4.8650	4.8625	4.8615	4.8610	4.8590	4.8585

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, as reported by Messrs. Pixley & Abell, Jan. 1 to Oct. :

	1909.	1910.	Changes.
India	£5,168,600	£5,517,000	I. £ 348,400
China	1,555,200	1,133,500	D. 421,700
Straits	82,800		D. 82,800
Total	£6,806,600	£6,650,500	D. £ 156,100

Copper, Tin, Lead and Zinc

Oct.-Nov.	NEW YORK							
	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.	
27	12¾ @12¾	12.60 @12.70	36¾	4.40 @4.30	4.25 @5.82½	5.82½ @5.70	5.67½ @5.70	
28	12¾ @12¾	12.60 @12.70	36¾	4.40 @4.30	4.25 @5.82½	5.82½ @5.70	5.67½ @5.70	
29	12¾ @12¾	12.60 @12.70	36¾	4.40 @4.30	4.25 @5.82½	5.82½ @5.70	5.67½ @5.70	
31	12¾ @12¾	12.60 @12.70	36¾	4.40 @4.30	4.25 @5.82½	5.82½ @5.70	5.67½ @5.70	
1	12¾ @12¾	12.65 @12.70	36¾	4.40 @4.30	4.25 @5.90	5.82½ @5.70	5.70 @5.75	
2	12¾ @12¾	12.65 @12.70	36¾	4.40 @4.30	4.25 @5.90	5.82½ @5.70	5.70 @5.75	

The New York quotations for electrolytic copper are for cakes, ingots and wirebars, and represent the bulk of the transactions made with consumers, basis New York, cash. The prices of casting copper and of electrolytic cathodes are usually 0.12c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

Oct.-Nov.	LONDON							
	Copper.			Tin.		Lead,	Zinc,	
	Spot.	3 Mos	Best Sel'td	Spot.	3 Mos	Spanish.	Ordinaries.	
27	56½	57¾	60¾	166	166	13½	24	
28	56½	57¾	61	165¾	166¾	13½	24	
29								
31	57	58½	61	166¾	167¾	13½	24½	
1	57½	58¾	61	167¾	167¾	13½	24½	
2	57½	58¾	61	168¾	168¾	13½	24½	

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17½c.; £12 = 2.61c.; £23 = 5c.; £60 = 13.04c. ± £1 = ± 0.21½c.

Copper—During the week of Oct. 27-Nov. 2 the market was quiet, but firm. The business was irregular, with substantial transactions one day and but little on another. The aggregate was probably in the neighborhood of 20,000,000 lb., chiefly electrolytic. Business in Lake copper was very dull. Some small sales were reported at fancy prices, but prime brands of the metal are still obtainable from first hands at 12 $\frac{7}{8}$ c., usual terms. The business in electrolytic copper was chiefly for foreign delivery, domestic manufacturers having been conspicuously inert in the market, and chiefly for November-December shipments, with some contracts for January. All of the agencies are offering at 12 $\frac{7}{8}$ c., delivered abroad or at home, usual terms, corresponding to about 12.70, cash, New York, and this price has been shaded on business effected. The largest interest came out with a price of 12 $\frac{7}{8}$ c., delivered, for January shipment. The market closes firm at 12 $\frac{3}{4}$ @12 $\frac{7}{8}$ c. for Lake and 12.65@12.70c. for electrolytic in cakes, ingots and wirebars. Casting copper is quoted nominally at 12 $\frac{3}{8}$ @12 $\frac{1}{2}$ c. as the average for the week.

Copper sheets are 18@19c. base for large lots. Full extras are charged, and higher prices for small quantities. Copper wire is 14c. base, carload lots at mill.

The standard market in London has advanced over £1. There is decidedly more confidence shown, and there is again a disposition to buy warrants for the bull account. Spot closes at £57 15s. and three months at £58 15s. per ton.

Statistics for the second half of October show a decrease of 3740 tons.

Exports of copper from New York for the week were 7521 long tons. Our special correspondent reports exports from Baltimore for the week at 3604 tons.

In its fiscal year ended Sept. 30, 1910, Nevada Consolidated sold 62,772,342 lb. of copper at average of 12.75c. per lb. Our quotational average for the same period was 12.84 cents.

The American Smelting and Refining Company has made a 10-year contract with the Tennessee Copper Company for the sale of the latter's copper, which heretofore has been sold by the United Metals Selling Company.

Tin—The perfect control exercised by the bull party in the London tin market was clearly demonstrated last week, when in face of an announcement of the shutting down of a large percentage of the tinplate mills of the American Sheet and Tin Plate Company, prices in London advanced. In this market the news had the effect of stopping purchases entirely and spot and near-by tin, of which there is a plentiful supply, was offered below the importation point, without finding buyers. When, at the beginning of this week, it became apparent, however, that the London bull interests persisted in their

campaign for a higher market, more interest was shown by dealers and consumers here, and prices advanced accordingly.

The London market closes strong at £168 7s. 6d. for spot and £168 12s. 6d. for three months, while November tin in this market is offered at about 36 $\frac{3}{4}$ cents.

Statistics for the month of October show a decrease of 2200 tons.

Lead—The market is unchanged at 4.40c. New York and 4.25@4.30c. St. Louis.

The activity abroad continues and the market is firm at £13 3s. 9d. for Spanish and £13 6s. 3d. for English lead.

Spelter—A continuance of good demand, resulting in some important transactions, has led to a further advance in the price. There are some indications of a widening in the margin between ore and spelter, which will, of course, be to the advantage of the smelters. Among the latter some continue to be steady sellers, while others maintain the policy of observation. At the close the metal is quoted at 5.72 $\frac{1}{2}$ @5.75c., St. Louis, and 5.87 $\frac{1}{2}$ @5.90c., New York.

The European market for spelter continues strong and advancing, and metal for early delivery is scarce. The London quotation for good ordinaries has risen to £24 2s. 6d., and specials £24 7s. 6d. per ton.

Zinc dust is quoted at 6 $\frac{3}{8}$ c. per pound.

Base price of zinc sheets is \$7.75 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

Other Metals

Aluminum—The market is a little firmer this week and prices are a shade better, 22c. per lb. being quoted for No. 1 ingots, New York.

Antimony—Business is still light, and prices are lower. Cookson's is now quoted at 8@8 $\frac{1}{8}$ c. per lb.; while 7 $\frac{1}{2}$ @7 $\frac{3}{4}$ c. is asked for U. S., and 7 $\frac{1}{8}$ @7 $\frac{3}{8}$ c. for outside brands.

Quicksilver—Business is fair, but the market is a little easier and prices are off a shade. New York quotations are \$45 per flask of 75 lb. for large lots, \$46@47 for jobbing orders. San Francisco, \$45 for domestic orders and \$2 less for export. The London price is £8 7s. 6d., but second hands sell at £8 per flask.

Cadmium—Current quotations are 60 @70c. per lb. in 100-lb. lots, f.o.b. New York, according to quantity of metal.

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., Oct. 29—The highest price paid this week for zinc ore was \$44.50; the base price of 60 per cent.

zinc was \$44@44.50. The base price paid for 80 per cent. lead ore was \$52 per ton.

SHIPMENTS, WEEK ENDED OCT. 29.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Mineral Point.....	1,494,490	.....	.....
Platteville.....	819,600	.....	503,000
Highland.....	507,800	.....	.....
Harker.....	428,590	45,600	70,080
Galena.....	402,800	.....	.....
Benton.....	322,090	.....	.....
Cuba City.....	168,070	.....	.....
Shullsburg.....	65,900	.....	.....
Total.....	4,209,340	45,600	573,080
Year to date.....	91,298,954	8,275,984	22,217,500

Shipped during the week to the separating plants, 2,657,035 lb. zinc concentrates.

Joplin, Mo., Oct. 29—The highest price paid for zinc sulphide ore this week was \$48, the base being \$43@46 per ton of 60 per cent. zinc. Zinc silicate sold on a base of \$22@26 per ton of 40 per cent. zinc. The average price all grades of zinc ore was \$41.24. The highest price paid for lead ore was \$53 per ton and the average price all grades was \$52.84 per ton.

The zinc-ore market was stronger this week than at any time since last March, and a big tonnage of ore was purchased that was not loaded, part of it on account of a shortage of cars and more because it was bought too late in the

SHIPMENTS, WEEK ENDED OCT. 29.

	Zinc, lb.	Lead lb.	Value.
Webb City-Carterville	4,604,000	875,600	\$122,190
Joplin.....	2,396,750	257,990	59,084
Galena.....	945,720	66,920	26,774
Alba-Neck.....	841,400	.....	19,772
Oronogo.....	317,280	184,260	11,921
Duenweg.....	513,930	61,340	11,803
Granby.....	331,630	44,160	6,700
Badger.....	290,860	700	6,126
Spurgeon.....	420,020	24,770	5,921
Aurora.....	354,840	.....	5,651
Quapaw.....	239,070	33,000	5,639
Miami.....	316,880	.....	4,436
Carthage.....	161,170	.....	3,626
Carl Junction.....	134,090	3,690	3,108
Stott City.....	66,100	30,320	2,209
Sarcoile.....	105,260	.....	1,803
Cave Springs.....	52,370	.....	1,125
Seneca.....	62,590	.....	625
Greenfield.....	50,580	.....	505
Totals.....	12,204,540	1,561,810	\$298,968

10 months.....492,069,480 71,113,470 \$11,550,606
Zinc value, the week, \$257,691; 10 mos., \$9,708,450
Lead value, the week, 41,277; 10 mos., 1,842,156

MONTHLY AVERAGE PRICES.

Month.	ZINC ORE.				LEAD ORE.	
	Base Price.		All Ores.		All Ores.	
	1909.	1910.	1909.	1910.	1909.	1910.
January.....	\$41.25	\$47.31	\$38.46	\$45.16	\$52.17	\$56.99
February.....	36.94	40.69	34.37	39.47	50.50	53.64
March.....	37.40	43.60	34.71	39.71	50.82	51.26
April.....	38.63	41.00	37.01	39.33	55.63	49.72
May.....	40.06	40.19	37.42	37.51	56.59	48.16
June.....	44.15	40.20	40.35	37.83	57.52	48.80
July.....	43.06	39.63	41.11	36.80	53.74	48.59
August.....	48.25	40.13	44.54	37.32	57.60	49.75
September.....	47.70	43.45	44.87	39.96	56.11	54.73
October.....	49.50	43.31	45.75	40.50	55.02	53.18
November.....	51.31	.....	48.29	.....	53.94	.....
December.....	49.45	.....	47.57	.....	55.26	.....
Year.....	\$43.98	.....	\$41.20	.....	\$54.60	.....

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

week to be loaded. The shipment for the ten months of this year is a decrease of 3612 tons of zinc ore and 1594 tons of lead ore and a decrease in value of \$453,201 from last year.

Other Ore Markets

Iron Ore—Current quotations for Lake Superior ores, on dock at Lake Erie ports, are: Bessemer ore—base 55 per cent. iron and under 0.45 phosphorus—\$5 per ton for Old Range and \$4.75 for Mesabi; nonbessemer—base 51.5 per cent. iron—\$4.20 for Old Range and \$4 for Mesabi.

In the East there is no organization of sellers, and a wire range of prices exists, according to quantity and location of mines. A good nonbessemer ore, around 50 to 55 per cent. iron, can be had at \$3@3.50 per ton, f.o.b. mines; but no general quotations can be given.

The use of foreign iron ore in the United States may be limited by the increase in ocean freights which has taken place this year. On Spanish ore the freight is now about 50c. per ton higher than it was a year ago. This will not affect existing contracts, but may make a considerable difference on contracts for next year. Prices of Spanish ore at mines have also been advanced, owing to the larger demand from Great Britain and Germany.

Manganese Ore—The base price, as fixed by large buyers, is 25c. per unit for manganese and 5c. per unit for iron content, for a base ore containing 49 per cent. or over in manganese, not over 0.20 phosphorus and 8 per cent. silica. Prices range down to 23c. per unit for 40 per cent. manganese; with deductions for excess of phosphorus and silica.

Tungsten Ore—Ferberite, wolframite and huebnerite ores, \$6.50@7 per unit per ton of 2000 lb. of ore containing 60 per cent. of tungsten trioxide. For scheelite ores, 50c.@1.50 per unit less.

Pyrites—Domestic pyrites are quoted at 11½@12c. per unit of sulphur at mines for furnace sizes. Spanish pyrites, furnace sizes, are 12@12½c. per unit, ex-ship. Arsenical pyrites are from ½@1¼c. per unit less.

Zinc Ores—For Rocky mountain blends of good quality, especially as to iron and lead contents, the current price is for the zinc content, less 8 units, at the St. Louis price of spelter; with a deduction of \$14@15 per 2000 lb. of ore. See also Joplin and Wisconsin ore markets.

CHEMICALS

New York, Nov. 2—The general market has not been active, and business has continued on a moderate basis.

Copper Sulphate—Business continues fair, with prices unchanged at \$4 per 100 lb. for carload lots and \$4.25 per 100 lb. for smaller parcels.

Arsenic—There is no change in the market, and quotations remain \$2.25@2.50 per 100 lb. for white arsenic.

Nitrate of Soda—A slightly improved trade in this article is reported and quotations are held rather firmly; 2.12½c. per lb. being asked for spot and 2.15c. for futures.

Potash Salts—Reports from Washington are that the negotiations with Germany on the potash-salts question are making no progress, and that there seems to be much difficulty in reaching any agreement.

Petroleum

San Francisco, Oct. 28—The arrangement entered into between the Associated Oil Company and the Union-Agency to combine their marketing energies on a mutual basis, has had the effect of bringing up California oil prices from 60 to 85c. at bay points. The Agency has issued its storage oil certificates guaranteeing a minimum price of 35c. per bbl. at the wells, and this has further strengthened the market. The surplus oil now stored in the State is 23,400,000 bbl. for the San Joaquin valley fields; 900,000 for the coast field and 981,500 for the southern fields, a total of 28,281,500 bbl. Over half of this is Standard Oil storage.

Cement

The retirement of J. Rogers Maxwell from the presidency of the Atlas Portland Cement Company, and the election in his place of John R. Morron, are generally understood to be the result of a transfer of large interests in the Atlas company to J. P. Morgan and associates. It is also generally understood that the change means some agreement between the Atlas and the Universal Portland Cement Company, which is a subsidiary of the United States Steel Corporation, and is the largest producer of cement in the country, next to the Atlas. The object is to bring about some arrangement as to regulating production and maintaining prices, which have suffered from competition and overproduction. An agreement was made two years ago to maintain a minimum price of 85c. per barrel, but this has not been observed, and it is said that sales have been made as low as 40c. The Atlas company has the contract for furnishing cement for the Panama Canal; it controls nearly one-third of the cement production of the country.

MINING STOCKS

New York, Nov. 2—The general stock markets have been rather reactionary during the week, closing uncertain and rather heavy. It has been a traders' market, with little definite tendency. The effort of certain interests to distribute

stocks on the recent rise does not seem to have been very successful.

On the Curb the copper stocks have been generally irregular, but with only fractional changes and a moderate volume of business. Cobalt stocks were quite active, La Rose being again the leader. Other mining stocks were not

COPPER PRODUCTION REPORTS.

Copper contents of blister copper, in pounds.

Company.	July.	August.	September.
Anaconda.....	.....	.....	22,200,000
Arizona, Ltd.....	2,910,000	2,620,000	2,672,000
Balclutha.....	1,100,000	.....	nd
Boleo (Mexico).....	2,272,600	2,639,520	2,061,300
Copper Queen.....	8,771,735	7,796,559	6,933,759
Calumet & Ariz.....	2,705,000	2,560,000	2,535,000
Cananea (Mexico).....	4,500,000	3,526,000	3,565,000
Detroit.....	1,800,000	2,100,000	2,128,000
East Butte.....	.....	.....	625,840
Imperial.....	800,000	400,000	nil
Mammoth.....	.....	.....	.....
Moctezuma (Mex.).....	1,958,637	1,630,204	2,211,435
Nevada Con.....	6,896,429	6,052,621	5,151,288
Old Dominion.....	2,000,000	2,693,000	2,262,000
Shannon.....	2,207,000	1,546,000	1,418,000
Superior & Pitts.....	2,224,000	2,520,000	2,125,000
Utah Copper Co.....	8,677,000	7,440,035	7,077,435
Butte District.....	23,750,000	23,750,000	.....
Lake Superior.....	19,000,000	18,800,000	16,750,000
Total production.....	90,804,411	85,473,949	79,628,571
Imports, bars, etc.....	17,714,034	13,324,788	.....
Total blister.....	108,518,445	98,798,727	.....
Deduct Can. & Mex.....	6,458,637	5,156,204	.....
Net blister rep.....	102,059,808	93,642,523	.....
Imp. in ore & matte.....	6,637,836	13,031,254	.....
Total.....	108,697,644	106,673,777	.....

Butte district and Lake Superior figures are estimated; others are reports received from companies. Imports duplicate production of Cananea, and that part of Copper Queen production which comes from Nacozari. Boleo copper does not come to American refiners. Utah Copper report includes the output of the Boston mill. Butte district production for September is given under Anaconda and East Butte.

STATISTICS OF COPPER.

Month.	United States Product'n.	Deliveries, Domestic.	Deliveries for Export.
XI. 1909.....	121,618,369	66,857,873	55,266,595
XII.....	117,828,655	69,519,501	59,546,570
Year.....	1,405,403,056	705,051,591	680,942,620
I. 1910.....	116,547,287	78,158,387	81,691,672
II.....	112,712,493	66,618,322	37,369,518
III.....	120,067,467	62,344,818	40,595,767
IV.....	117,477,639	67,985,351	31,332,434
V.....	123,242,476	59,305,222	45,495,400
VI.....	127,219,188	53,363,196	65,805,948
VII.....	118,370,003	56,708,175	59,407,167
VIII.....	127,803,618	67,731,271	61,831,780
IX.....	119,519,983	64,501,018	75,106,496
X.....	.....	.....	.....

VISIBLE STOCKS.

	United States.	Europe.	Total.
XI. 1909.....	153,509,626	222,566,400	376,076,026
XII.....	151,004,527	236,857,600	389,862,127
I. 1910.....	141,766,111	244,204,800	385,970,911
II.....	98,463,339	248,236,800	346,700,139
III.....	107,187,992	254,150,400	361,338,392
IV.....	123,824,874	249,625,000	373,450,474
V.....	141,984,159	246,870,400	388,854,559
VI.....	160,425,973	239,142,400	399,568,373
VII.....	168,386,017	232,892,800	401,278,817
VIII.....	170,640,678	222,320,000	392,960,678
IX.....	168,861,245	218,444,800	387,306,045
X.....	148,793,714	211,276,800	360,070,514
XI.....	.....	198,000,800	.....

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

much in evidence. The market closes rather dull and heavy.

Boston, Nov. 1—Matters in copper stocks have not been as promising as last week. There seemed to be a weight on the market, and it was dull and narrow. Many stocks lost on a small volume of business. Copper Range dropped \$1.50 to \$71, while Calumet & Arizona lost \$3.25. North Butte, Utah Copper and American Zinc also recorded some recessions. Lake subscription rights sold at 35c. There seemed to be an absence of interest in the market, which was decidedly disappointing. At the close there was a little brightening up, but interest was still notably lacking.

The Curb generally was dull and heavy, with a tendency to lower quotations.

Table with columns: Company, Delinq., Sale, Amt. Lists various copper companies and their financial details.

Table titled 'Monthly Average Prices of Metals SILVER'. Columns: Month, New York, London. Rows: January to December.

Table titled 'COPPER'. Columns: NEW YORK, London. Sub-columns: Electrolytic, Lake. Rows: January to December.

Table titled 'TIN AT NEW YORK'. Columns: Month, 1909, 1910. Rows: January to December.

Table titled 'LEAD'. Columns: Month, New York, St. Louis, London. Sub-columns: 1909, 1910. Rows: January to December.

Table titled 'SPELTER'. Columns: Month, New York, St. Louis, London. Sub-columns: 1909, 1910. Rows: January to December.

Table titled 'PRICES OF PIG IRON AT PITTSBURG.'. Columns: Bessemer, Basic, No. 2 Foundry. Sub-columns: 1909, 1910. Rows: January to December.

Table titled 'STOCK QUOTATIONS'. Columns: COLO. SPRINGS Nov. 1, SALT LAKE Nov. 1. Rows: Name of Comp., Bid.

Table titled 'SAN FRANCISCO. Nov. 1.'. Columns: Name of Comp., Clg., Name of Comp., Bid. Includes COMSTOCK STOCKS and MISC. NEV. & CAL.

Table titled 'N. Y. EXCH. Nov. 1.'. Columns: Name of Comp., Clg., Name of Comp., Clg. Includes Am. Agri. Chem., Am. Sm. & Ref., etc.

Table titled 'N. Y. CURB Nov. 1.'. Columns: Name of Comp., Clg., Name of Comp., Clg. Includes Ariz.-Cananea, Barnes King, etc.

Table titled 'BOSTON EXCH. Nov. 1.'. Columns: Name of Comp., Clg., Name of Comp., Clg., Last. Includes Adventure, Algomah, etc.

New York, cents per pound. Electrolytic for cakes, ingots or wirebars. London, pounds sterling per long ton, standard copper.

THE MINING INDEX

A CLASSIFIED BIBLIOGRAPHY OF THE CURRENT LITERATURE OF MINING AND METALLURGY.

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

COAL AND COKE

- 13,628—**ACCIDENTS**—Mining Accidents; Present Conditions in Great Britain. T. Good. (Cassier's Mag., Aug., 1910; 4 pp.) 40c.
- 13,629—**ANALYSIS**—The Accuracy Obtainable in Fuel Calorimetry. C. Nevill Huntly. (Journ. Soc. of Chem. Ind., Aug. 15, 1910; 4½ pp.)
- 13,630—**BRIQUETTING**—Coal Briquetting in 1909. Edward W. Parker. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1909; 14½ pp.)
- 13,631—**COAL-DUST EXPLOSIONS**—The Prevention of Coal-Dust Explosions by Zone Systems. (Coll. Guard., Sept. 2, 1910; 1½ pp.) Paper before North Staffordshire Inst. of Min. and Mechan. Engrs. 40c.
- 13,632—**COKE** from "Non-Coking" Coal, as Made at the Bluff Colliery, Central District, Queensland. (Queensland Govt. Min. Journ., Aug. 15, 1910; 1½ pp., illus.) 60c.
- 13,633—**COKE**—Suction Device for Drawing Off Coke-Oven Fumes. A. Gradenwitz. (Eng. and Min. Journ., Oct. 22, 1910; 1 p., illus.) 20c.
- 13,634—**COKE MANUFACTURE**. A. Short. (Journ. Soc. of Chem. Ind., Aug. 15, 1910; 8 pp., illus.)
- 13,635—**COKE-OVEN GAS**—The Use of Coke-Oven Gas as Fuel. Thomas J. Brown. (Journ. Min. Soc. of Nova Scotia, Vol. XV, 1909; 8 pp.)
- 13,636—**CONSERVATION** as it Affects Coal Lands. E. W. Parker. (Min. and Sci. Press, Oct. 8, 1910; 2 pp.) Paper before Am. Min. Congress. 20c.
- 13,637—**ELECTRIC SHOCKS** in Coal Mines. S. F. Walker. (Eng. and Min. Journ., Oct. 8, 1910; 5 pp.) 20c.
- 13,638—**EXPLOSIONS**—Some Causes and Prevention of Colliery Explosions. G. H. Winstanley. (Iron and Coal Tr. Rev., Sept. 30, 1910; 2½ pp.) Lecture before Nat. Assn. of Colliery Managers. 40c.
- 13,639—**EXPLOSIVES**—Use of Explosives in British Coal Mines. (Eng. and Min. Journ., Sept. 24, 1910; 1 p.) 20c.
- 13,639a—**FUEL SUPPLY**—Facts Concerning Present Fuel Situation. Floyd W. Parsons. (Eng. and Min. Journ., Oct. 15, 1910; 2 pp., illus.) 20c.
- 13,640—**HAULAGE**—Description of Haulage System Installed to Take the Place of Horses at No. 3 and No. 4 Collieries of the Nova Scotia Steel and Coal Company, Ltd., at Sidney Mines, Nova Scotia. John Johnston. (Journ. Min. Soc. of Nova Scotia, Vol. XV, 1909; 4 pp., illus.)
- 13,641—**LOW-GRADE FUEL**—Use of Low-Grade Fuel under Boilers. John Preston. (Journ. Min. Soc. of Nova Scotia, Vol. XV, 1909, 3 pp.)
- 13,642—**MINING, PREPARING AND COKING COAL** at Marting, W. Va. (Mines and Minerals, Oct., 1910; 3½ pp., illus.) 40c.
- 13,643—**POWER PLANT**—Storage Battery Extension to Colliery Power Plant. (Eng. and Min. Journ., Sept. 24, 1910; 1½ pp., illus.) 20c.
- 13,644—**QUEENSLAND**—Recent Discovery of Coal near Dalby. W. E. Cameron. (Queensland Govt. Min. Journ., Aug. 15, 1910; 2½ pp., illus.) 60c.
- 13,645—**SAMPLING**—Mechanical Coal Sampler Used at Plant of United Railways and Electric Company, Baltimore. C. E. Scott.

(Mines and Minerals, Oct., 1910; 1½ pp., illus.) 40c.

13,646—**SAMPLING COAL AND COKE**. E. G. Bailey. (Mines and Minerals, Oct., 1910; 2¾ pp.) 20c.

13,647—**SAND FILLING**—Wirkungen des Abbaues mit Sandspülversatz auf das Deckgebirge im Felde der Königin Luise-Grube, Ackermann. (Glückauf, Aug. 20, 1910; 7 pp., illus.) 40c.

13,648—**SIZING, SORTING AND WASHING** of Coal. W. Bardill. (Iron and Coal Tr. Rev., Oct. 7, 1910; 2 pp.) 40c.

13,649—**WASTE WATER**—Klärung von Zechenabwasser in Emschergebiet. Müller. (Glückauf, Oct. 1, 1910; 4 pp., illus.) 40c.

13,650—**WEST VIRGINIA**—Notes on the Coal Industry in West Virginia. R. B. Brinsmade. (Eng. and Min. Journ., Oct. 15, 1910; 1½ pp.) 20c.

COPPER

13,651—**ANALYSIS**—The Determination of Copper by the Color and Cyanide Methods. Arthur Austin. (West. Chem. and Met., Sept., 1910; 12 pp.) 80c.

13,652—**ANALYTICAL METHODS** in the Cananea Laboratory. F. G. Hawley. (Eng. and Min. Journ., Oct. 1, 1910; 4 pp.) 20c.

13,653—**CHLORINATION**—Die Chloration des Kupfers auf nassem und trockenem Wege und ihre Reaktionen. Rudolf Franke. (Metallurgie, Aug. 8, 1910; 8½ pp., illus.) 40c.

13,653a—**CONCENTRATION**—Vakuum-Konzentration in Sullitelma. C. Göpner. (Metallurgie, Sept. 22, 1910; 2½ pp., illus.) Translation of a paper by Holm Holmsen and H. N. Rees on the concentration of copper ores at Sullitelma by the Elmore process. 40c.

13,654—**ELECTRIC EXTRACTION AND REFINING** of Copper. John B. C. Kershaw. (Metal. Ind., Oct., 1910; 3 pp., illus.) 20c.

13,655—**IMPURITIES**—The Influence of Impurities on the Properties of Copper. F. Johnson. (Met. and Chem. Eng., Oct., 1910; 5 pp., illus.) 40c.

13,656—**LEACHING** Applied to Copper Ore. W. L. Austin. (Mines and Methods, Sept., 1910; 4 pp.) 20c.

13,657—**SINTERING**—Agglomerating Ore Fines and Flue Dust. Herbert Haas. (Eng. and Min. Journ., Oct. 22, 1910; 3½ pp., illus.) 20c.

13,658—**SMELTING** at Nishni Tagl in the Ural Mountains. F. W. Draper. (Eng. and Min. Journ., Sept. 24, 1910; 3 pp.)

GOLD AND SILVER

13,658a—**ALASKA**—Annual Report of Alaska-Treadwell Company. (Eng. and Min. Journ., Oct. 8, 1910; 1½ pp., illus.) 20c.

13,659—**ASSAY** of Arsenical Nickel-Cobalt-Silver Ore. Denison K. Bullens. (Eng. and Min. Journ., Oct. 22, 1910; 2 pp., illus.) 20c.

13,660—**ASSAYING**—The Effect of Varying Amounts of Litharge in the Fire Assay for Silver. Kenneth Williams. (Journ. Ind. and Eng. Chem., Oct., 1910; ¾ p.) 60c.

13,661—**ASSAYING**—Solubility of Gold in Nitric Acid. H. H. Fenwick. (Pacific Miner, Sept., 1910; 1½ pp.) 20c.

13,662—**BRAZIL**—Notes on Passagem Mine and Works. (The Ouro Preto Gold Mines of Brazil, Limited.) A. J. Bensusan. (Bull. 75, I. M. M., Oct. 15, 1910; 22½ pp., illus.)

13,663—**BRITISH COLUMBIA**—Report on Certain Mineral Claims in Atlin, Bella Coola and Nanaimo Mining Divisions. Herbert Carmichael. (B. C. Bureau of Mines, Bull. 1, 1910; 14 pp., illus.)

13,664—**CHLORINE**—The Whiting Electrolytic Cell. J. Whiting. (Trans. Am. Electrochem. Soc., Vol. XVII, 1910; 14 pp., illus.)

13,665—**CHLORINATION**—West Works—Mount Morgan Chlorination. C. H. Humphreys. (Queensland Govt. Min. Journ., Aug. 15, 1910; 2½ pp.) Paper before Australasian Inst. of Min. Engrs. 60c.

13,666—**COBALT** in 1910. Arthur A. Cole. (Eng. Mag., Oct., 1910; 16 pp., illus.) 40c.

13,667—**COSTA RICA**—Mines and Mill of Montezuma Mines, Costa Rica. S. F. Shaw.

(Eng. and Min. Journ., Oct. 8, 1910; 2 pp., illus.) 20c.

13,668—**CRUSHING**—The Grinding Pan. Donald Winslow. (Pacific Miner, Sept., 1910; 1¼ pp., illus.) 20c.

13,669—**CYANIDING**—The Designing of a Sand-Leaching Plant. R. Stuart Browne. (Pacific Miner, Sept., 1910; 4 pp., illus.) Continuation of article previously indexed. 20c.

13,670—**CYANIDING**—Rapid Estimation of Available Calcium Oxide in Lime Used in Cyanide Work. L. W. Barney. (Journ. Ind. and Eng. Chem., Oct., 1910; 1¾ pp.) 60c.

13,671—**CYANIDING**—The New Clancy Cyanide Patents. (Eng. and Min. Journ., Oct. 8, 1910; 3 pp.) 20c.

13,672—**DREDGING**—Notes on the Construction of California Dredges. John Tysowski. (Eng. and Min. Journ., Oct. 15, 1910; 4 pp., illus.) 20c.

13,673—**DREDGING**—The Miles Tallings Stacker for Use on Dredges. (Eng. and Min. Journ., Sept. 24, 1910; 1 p., illus.) 20c.

13,674—**HYDRAULIC MINING** of Auriferous Gravels. James W. Phillips. (Journ. West. Soc. Engrs., Aug., 1910; 40 pp., illus.) 40c.

13,675—**HYDROMETALLURGY**—Modern Hydrometallurgy in Australia. J. R. Masson and J. E. Edwards. (Met. and Chem. Eng., Oct., 1910; 2¾ pp., illus.) 40c.

13,676—**MEXICO**—El Chico District, Hidalgo, Mexico. L. Pascoe. (Eng. and Min. Journ., Oct. 1, 1910; ½ p.) 20c.

13,677—**MEXICO**—Mineral Resources of the State of Guerrero. W. Niven. (Eng. and Min. Journ., Oct. 1, 1910; 3 pp., illus.) 20c.

13,678—**MEXICO**—Mining and Smelting at Achotla Mine, Guerrero. W. B. Devereux. (Eng. and Min. Journ., Oct. 1, 1910; 1½ pp., illus.) 20c.

13,679—**MEXICO**—Mining Operations in the State of Chihuahua. W. H. Seamon. (Eng. and Min. Journ., Oct. 1, 1910; 2 pp.) 20c.

13,680—**MEXICO**—Operations at the Mexico Mines of El Oro. (Eng. and Min. Journ., Oct. 1, 1910; 1½ pp., illus.) 20c.

13,681—**MEXICO**—San Javier, an Old Silver District of Sonora. C. N. Nelson. (Eng. and Min. Journ., Oct. 1, 1910; 1½ pp., illus.) 20c.

13,682—**MEXICO**—Taxco District. Boris Gorow. (Mex. Min. Journ., Oct., 1910; 2½ pp., illus.) 20c.

13,683—**MEXICO**—The Altar Gold Placer Fields of Sonora, Mexico. (Eng. and Min. Journ., Oct. 1, 1910; 2½ pp., illus.) 20c.

13,684—**MEXICO**—Yocuivo Mine and Mill, Western Chihuahua. W. H. Seamon. (Eng. and Min. Journ., Oct. 22, 1910; 1½ pp., illus.) 20c.

13,685—**MONTANA**—History and Geology of the Garnet District, Mont. J. P. Rowe. (Min. Wld., Oct. 15, 1910; 5 pp., illus.) 20c.

13,686—**MONTANA**—Judith Basin, Montana. (Min. and Sci. Press, Sept. 24, 1910; 3 pp., illus.) 20c.

13,687—**NEVADA**—Notes on Operations in Jarbidge Camp, Nevada. Winthrop W. Fisk. (Eng. and Min. Journ., Oct. 15, 1910; 1¾ pp., illus.) 20c.

13,688—**ONTARIO**—The Quartz Diabases of Nipissing District, Ontario. W. H. Collins. (Econ. Geol., Sept., 1910; 15 pp., illus.) 60c.

13,689—**ONTARIO**—Present Developments at Gowganda. G. M. Colvocoresses. (Can. Min. Journ., Oct. 1, 1910; 5 pp., illus.) 20c.

13,690—**ONTARIO**—The Porcupine Trill. R. E. Hore. (Can. Min. Journ., Oct. 15, 1910; 5½ pp., illus.) 20c.

13,691—**ORE DEPOSITS**—The Agency of Manganese in the Superficial Alteration and Secondary Enrichment of Gold Deposits in the United States. Wm. H. Emmons. (Bull. A. I. M. E., Oct., 1910; 70 pp., illus.)

13,692—**ORE-REDUCTION PLANT** at City Deep Mines, Ltd. R. Gascoyne. (Min. Wld., Oct. 22, 1910; 2 pp., illus.) 20c.

13,693—**ORE TREATMENT**—Treatment of Refractory Low-Grade Gold Ores at the Ouro Preto Gold Mine, Brazil. R. H. Kendall. (Bull. 75, I. M. M., Oct. 15, 1910; 23½ pp.)

13,694—PERU—Bedded Gold Quartz Veins near Poto, Peru. E. C. Thurston. (Eng. and Min. Journ., Sept. 24, 1910; 1 p., illus.) 20c.

13,695—PLACERS—Testing Placers in Korea. R. Y. Hanlon. (Min. and Sci. Press, Oct. 8, 1910; 1 p., illus.) 20c.

13,696—SAND FILLING on the Witwatersrand. Edgar Pam. (Journ. Chem., Met. and Min. Soc. of So. Africa, Aug., 1910; 2½ pp., illus.) Discussion on paper previously indexed. 60c.

IRON AND STEEL

13,697—BLAST-FURNACE CHARGING with Telpher Lines. (Iron and Coal Tr. Rev., Sept. 16, 1910; 2 pp., illus.) 40c.

13,697a—BLAST-FURNACE GAS—Ueber den heutigen Stand der Gichtgasreinigung in Deutschland. C. Grosse. (Stahl u. Eisen, Aug. 24, 1910; 19 pp., illus.) Conclusion of article previously indexed. 40c.

13,698—BLAST-FURNACE GAS—The Purification of Blast-Furnace Gas in Germany. Curt Grosse. (Iron and Coal Tr. Rev., Oct. 14, 1910; 1½ pp., illus.) Paper before Internat. Cong. of Mining, Metallurgy, etc., at Dusseldorf. 40c.

13,699—BLAST-FURNACE STOCK HANDLING AND CHARGING APPARATUS. W. H. Graham. (Journ. Min. Soc. of Nova Scotia, Vol. XV, 1909; 4 pp., illus.)

13,700—BRIQUETTING of Iron Ores. C. de Schwarz. (Engineering, Sept. 30, 1910; 1½ pp.) Paper before Iron and Steel Institute, Sept. 27, 1910. 40c.

13,701—CAST IRON—The Constitution of Cast Iron. (Trans. Am. F'dymen's Assn., Vol. XIX, 1909; 156 pp.)

13,702—CONCENTRATION of Low-Grade Magnetites. G. C. Mackenzie. (Annual Report, Ont. Bureau of Mines, 1910; Vol. XIX, Part I; 19 pp.)

13,703—CRUCIBLE STEEL—The Passing of Crucible Steel. Joseph W. Richards. (Met. and Chem. Eng., Oct., 1910; 5½ pp., illus.) 40c.

13,703a—ELECTRIC POWER—The Utilization of Electric Power in the Iron and Steel Industry; with Special Reference to the Economical Speed Regulation of the Motors. J. J. Schuurman. (Iron and Coal Tr. Rev., Sept. 30, 1910; 3½ pp., illus.) Paper before Iron and Steel Institute. 40c.

13,704—ELECTRIC SMELTING—Recent Advances in the Construction of Electric Furnaces for the Production of Pig Iron, Steel and Zinc. Eugene Haanel. (Bull. 3, Dept. of Mines, Canada, 1910; 76 pp., 4 pl., illus.)

13,705—ELECTRIC SMELTING—The Direct Manufacture in the Electric Furnace of Steels and Ferro-Alloys. R. M. Keeney and G. M. Lee. (West. Chem. and Met., Sept., 1910; 14 pp.) 80c.

13,706—IRON-ORE OCCURRENCE—The Occurrence and Origin of Some Bog-Iron Deposits in the District of Thunder Bay, Ontario. Elwood J. Moore. (Econ. Geol., Sept., 1910; 10 pp.) 60c.

13,707—IRON-ORE RESOURCES OF THE WORLD. L. De Launay. (Iron Age, Sept. 22, 1910; 2½ pp.) Paper before Internat. Congress of Geologists, Stockholm, Sweden, Aug., 1910. 20c.

13,708—IRON RESOURCES of the Republic of Mexico. Ezequiel Ordoñez. (Eng. and Min. Journ., Oct. 1, 1910; 2 pp.) From an article prepared for Internat. Geol. Congress. 20c.

13,709—MELTING—Oxygen Process for Melting of Iron. Alfred Gradewitz. (Mines and Minerals, Oct., 1910; 2 pp., illus.) 20c.

13,710—MILL BUILDING—Design of Steel Mill Building, of Illinois Steel Company. F. E. Davidson. (Journ. West. Soc. of Eng., Aug., 1910; 9 pp., illus.) 40c.

13,710a—MINING—Underground Methods on the Gogebic Range. Percival S. Williams. (Min. Wld., Sept. 10, 1910; 2½ pp., illus.) Paper before Lake Superior Mining Institute. 20c.

13,711—MINING AND ORE TREATMENT—Deep Mining and Treatment of Iron Ore at Oxford, N. J. (Iron Tr. Rev., Sept. 22, 1910; 3 pp., illus.) 20c.

13,712—ONTARIO—Lake Savant Iron Range Area. E. S. Moore. (Annual Report, Ont. Bureau of Mines, 1910; Vol. XIX, Part I; 20½ pp., illus.)

13,713—ORE TREATMENT—The South Varanger Iron Ore Deposits and Separating and Briquetting Plants. (Engineering, Sept. 16, 1910; 3½ pp., illus.) 40c.

13,714—REFINING—Electric Steel Refining. D. F. Campbell. (Iron and Coal Tr. Rev., Sept. 30, 1910; 1½ pp., illus.) Paper before Iron and Steel Institute. 40c.

13,715—SEGREGATION in Soft Steel Ingots. (Iron Age, Sept. 29, 1910; 4 pp., illus.) 20c.

13,716—SLAG CEMENT—The Colloseus Process for Making Slag Cement. F. A. Tal-

bot. (Eng. and Min. Journ., Sept. 24, 1910; 1½ pp., illus.) 20c.

13,717—TRANSPORTATION—Ueber Bewegung und Lagerung von Eisenerzen auf Grubenanlagen. K. Glinz. (Stahl u. Eisen, Aug. 31 and Sept. 14, 1910; 17½ pp., illus.) 60c.

13,718—VALUATION OF PIG IRON. The. J. H. Linton. (Foundry, Oct., 1910; 1 p.)

13,719—WASHING ORE—New Plant for Washing Iron Ore, Mesabi Range. E. K. Soper. (Eng. and Min. Journ., Oct. 8, 1910; 2½ pp., illus.) 20c.

LEAD, ZINC AND OTHER METALS

13,720—ALUMINUM—The Electric Extraction and Refining of the Non-Ferrous Metals. John B. C. Kershaw. (Metal. Ind., Sept., 1910; 2 pp., illus.) 20c.

13,721—CADMIUM—The Use of Organic Electrolytes in Cadmium Separation. Mary E. Holmes and Mary V. Dover. (Journ. Am. Chem. Soc., Oct., 1910; 5 pp.) 80c.

13,722—MANGANESE—A New Volumetric Method for the Determination of Manganese. F. J. Metzger and Robert F. McCrackan. (Journ. Am. Chem. Soc., Oct., 1910; 1 p.) 80c.

13,723—QUICKSILVER—The James Apparatus for Quicksilver Determination. G. A. James. (Eng. and Min. Journ., Oct. 22, 1910; ½ p.) 20c.

13,724—STRONTIUM—Metallic Strontium. B. L. Glascock. (Journ. Am. Chem. Soc., Oct., 1910; 8 pp.) 80c.

13,725—TIN—Mouri Bischoff Mine. F. H. Bathurst. (Min. Mag., Sept., 1910; 8 pp., illus.) 40c.

13,726—TIN—Operations and Policy of Dolcoath Mine. (Eng. and Min. Journ., Oct. 8, 1910; 1½ pp.) 20c.

13,727—TIN—Ueber Verhüttung bolivianischer Zinnerze auf deutschen Schmelzhütten. H. Schüpphaus. (Metallurgie, Sept. 8, 1910; 4 pp.) 40c.

13,728—TIN MINING in Bolivia. William Gray and Arnold L. Halden. (Min. Mag., Sept., 1910; 3 pp., illus.) 40c.

13,729—TUNGSTEN and the Moose River Scheelite Veins. A. A. Hayward. (Journ. Min. Soc. of Nova Scotia, Vol. XV, 1909; 14 pp.)

13,729a—TUNGSTEN—Structure of the Tungsten Deposits of Moose River, N. S. E. R. Faribault. (Journ. Min. Soc. of Nova Scotia, Vol. XV, 1909; 6 pp.)

13,730—ZINC—Economic Conditions in the Joplin District. T. Lane Carter. (Eng. and Min. Journ., Oct. 15, 1910; 2½ pp., illus.) 20c.

13,731—ZINC of Nevada. A. G. Hillen. (Los Angeles Min. Rev., Sept. 24, 1910; 2 pp., illus.) 40c.

13,732—ZINC—Polymorphie und elektrischer Widerstand des Zinks. Carl Bendicks. (Metallurgie, Sept. 8, 1910; 6 pp., illus.) 40c.

13,733—ZINC—The Chemical Analysis of Spelter. Andrew M. Fairlie. (Metal. Ind., Sept., 1910; 2 pp.) To be continued. 20c.

13,734—ZINC—The Electrolytic Determination of Zinc in Ores. Geo. Kemmerer. (Journ. Ind. and Eng. Chem., Sept., 1910; 1½ pp.) 80c.

13,735—ZINC MINING in Tennessee. S. W. Osgood. (Extract G from Bull. No. 2, Tenn. Geol. Survey, 1910; 16½ pp., illus.)

13,736—ZINC ORE DRESSING in Colorado. H. C. Parmelee. (Met. and Chem. Eng., Oct., 1910; 2 pp., illus.) 40c.

NONMETALLIC MINERALS

13,737—CEMENT—Manufacture and Use of Slag Cement and Other Substitutes for Portland Cement. W. D'Roohan. (Eng.-Contracting, Aug. 24, 1910; 1½ pp.) 20c.

13,738—CEMENT—The Portland-Cement Industry of the United States and Canada. A. C. Davis. (Proc. Instn. of Civ. Engrs., Vol. CLXXX, Part 2, 1909-10; 15½ pp.)

13,739—GYPSUM DEPOSITS of New York. D. H. Newland and Henry Leighton. (Bull. 143, N. Y. State Museum, Oct. 1, 1910; 94 pp.)

13,740—NATURAL GAS—The Kent Gas Field, Ontario. G. R. Mickle. (Annual Report, Ont. Bureau of Mines, 1910; Vol. XIX, Part I; 4½ pp.)

13,741—PETROLEUM—Commercial Value of the Oil Shales of Eastern Canada, Based on Their Contents by Analysis in Crude Oil and Ammonium Sulphate. R. W. Ellis. (Journ. Min. Soc. of Nova Scotia, Vol. XV, 1909; 29 pp.)

13,742—PETROLEUM in Queensland. Lionel C. Ball. (Queensland Govt. Min. Journ., Aug. 15, 1910; 1½ pp.) 60c.

13,743—PETROLEUM—The Commonwealth Oil Corporation, Ltd. (Australian Min. and Eng. Rev., Sept. 5, 1910; 7¼ pp., 1 pl., illus.) 40c.

13,744—PETROLEUM—The Santa Maria Fields. Edward Morris. (Oil Industry, Sept. 15, 1910; 2½ pp., illus.) 20c.

13,745—PETROLEUM—The Whittier Fields and Contiguous Territory, California. William Plotts. (Oil Industry, Sept. 15, 1910; 2¼ pp., illus.) 20c.

13,746—PETROLEUM—Valuation of Oil Properties. F. J. H. Merrill. (Los Angeles Min. Rev., Sept. 24, 1910; 5 pp., illus.) 40c.

13,747—PETROLEUM FIELDS of Russian Sakhalin. Paul Dvorkovitz. (Petrol. Rev., Oct. 8, 1910; 4 pp., illus.) 40c.

13,748—PETROLEUM AND NATURAL GAS—A Proposed Classification of Petroleum and Natural-Gas Fields Based on Structure. Frederick G. Clapp. (Econ. Geol., Sept., 1910; 19½ pp., illus.) 60c.

13,749—PHOSPHATE ROCK—Western Phosphate Mines. Morse S. Duffield. (Mines and Methods, Sept., 1910; 4¼ pp., illus.) 20c.

ECONOMIC GEOLOGY—GENERAL

13,750—ANHYDRITE AS A GANGUE MINERAL. Waldemar Lindgren. (Econ. Geol., Sept., 1910; 5½ pp.) 60c.

13,751—BRITISH COLUMBIA—Geology and Ore Deposits of LaFrance Creek. Newton W. Emmens. (Min. Wld., Sept. 10, 1910; 2½ pp., illus.) 20c.

13,752—COLORADO—Geology of Part of Ten-Mile Range, Colorado. Arthur Lakes. (Min. Wld., Sept. 10, 1910; 2¼ pp., illus.) 20c.

13,753—HUNGARY—Ueber kontakt metamorphe Eisen-Mangan-Lagerstätten am Aranyos Flusse, Siebenbürgen. Schöppe. (Zeit. f. prakt. Geol., Sept., 1910; 30½ pp., 1 pl.) 40c.

13,754—MEXICO—Notes on the Archean Rocks of Mexico. (Eng. and Min. Journ., Oct. 22, 1910; 1½ pp.) 20c.

13,754a—MAINE—Some Ore Deposits in Maine and the Milan Mine, New Hampshire. William H. Emmons. (Bull. 432, U. S. Geol. Surv., 1910; 62 pp., illus.)

13,755—MONTANA—Stratigraphic Relations of the Livingston Formation of Montana. R. W. Stone and W. R. Calvert. (Econ. Geol., Sept., 1910; 6 pp., 1 pl.) 60c.

13,756—ORE DEPOSITION—Criteria of Downward Sulphide Enrichment. F. L. Ramsome. (Econ. Geol., Sept., 1910; 10½ pp.) Discussion of paper previously indexed. 60c.

13,757—OXIDATION—The Effect of Oxidation on the Value of a Mineral Deposit. J. B. Wilson. (Aust. Min. Stand., Aug. 24, 1910; 1½ pp.) 40c.

MINING—GENERAL

13,758—ACCIDENTS—The Prevention of Mine Accidents. (Eng. and Min. Journ., Sept. 24, 1910; 6½ pp.) Report of Committee appointed at the meeting of the Am. Min. Congress, Nov., 1906. 20c.

13,759—ACCOUNTING—Rand Gold Mining Accounts—XII and XIII. G. W. Tait. (So. African Min. Journ., July 23 and Aug. 27, 1910; 2¼ pp.) 60c.

13,760—AERIAL TRAMWAY—Utah Consolidated Aerial Tramway. Leroy A. Palmer. (Mines and Minerals, Oct., 1910; 2 pp., illus.) 20c.

13,761—AERIAL TRAMWAYS—Modern Improvements in Overhead Mechanical Transport. T. Falke. (Journ. Transvaal Inst. of Mech. Engrs., Sept., 1910; 13 pp., illus.) 60c.

13,762—ALASKA—History of Mining in Alaska. D. A. Macdonald. (Pacific Miner., Sept., 1910; 3½ pp., illus.) Continuation of article previously indexed. 20c.

13,763—ASIA MINOR—The Mineral Resources of Asia Minor. (Min. Journ., Oct. 15, 1910; 2 pp.) 40c.

13,764—BLASTING—Precautions for Maximum Safety and Effectiveness in Blasting. (Eng. News, Sept. 22, 1910; 1½ pp., illus.) 20c.

13,765—BRITISH COLUMBIA—Recent Mineral Discoveries at Poplar, B. C. Newton W. Emmens. (Min. Wld., Sept. 24, 1910; 1 p., illus.) 20c.

13,766—BUILDINGS—Fireproof Buildings for Mining Companies. Ernest McCullough. (Min. Wld., Oct. 8, 1910; 2¼ pp., illus.) 20c.

13,767—CAPITALIZATION OF SMALL MINES. A. W. Warwick. (Eng. and Min. Journ., Oct. 15, 1910; 1½ pp.) 20c.

13,768—COMPRESSED AIR—Die Erzeugung und Verwendung von Druckluft im deutschen Bergbau zu Beginn des Jahres 1910. Ihering. (Glückauf, Aug. 27, 1910; 15 pp.) 40c.

13,769—CONVEYER—Water Flume Conveyers at Mount Lvell for Handling Firewood. E. Carus Driffeld. (Queensland Govt. Min. Journ., July 15, 1910; 4 pp., illus.) Paper before Australasian Inst. of Min. Engrs. 60c.

13.770—COSTS—Labor and Tonnage Chart as Aids in Reducing Costs as Used at Highland Boy Mine. Claude T. Rice. (Eng. and Min. Journ., Oct. 15, 1910; 1½ pp., illus.) 20c.

13.771—EXPLOSIONS—Protective Value of Humidity. James Ashworth. (Mines and Minerals, Oct., 1910; 1½ pp.) 20c.

13.771a—EXPLOSIVES—Ueber Sprengmittel. (Bergbau, July 14 and 21, 1910; 3½ pp.) 40c.

13.772—GUATEMALA—Mineral Wealth of Guatemala. Rene Guerin. (Min. Journ., Sept. 17, 1910; 1 p.) 40c.

13.773—HAULAGE—Streckenförderung unter Tage. Tillmann. (Glückauf, Aug. 6 and 13, 1910; 14 pp., illus.) 60c.

13.774—HAULAGE—Third Rail System of Electric Haulage at the Portland Mine. Franklin P. Wood. (Min. Sci., Sept. 13, 1910; 2 pp., illus.) 20c.

13.775—LABOR—The Efficiency of Labor Under Ground. Tom Johnson. (Journ. Chem., Met. and Min. Soc. of So. Africa, Aug., 1910; 3½ pp., illus.) 60c.

13.776—MEXICO—Mining and Smelting in Aguascalientes. B. Newman. (Eng. and Min. Journ., Oct. 1, 1910; 1½ pp., illus.) 20c.

13.777—MEXICO—Revival in Ures. Hermosillo and Sahuaripa District. W. L. Wilson. (Eng. and Min. Journ., Oct. 1, 1910; ½ p.) 20c.

13.778—MEXICO—The Guaynopa District of Chihuahua. Wm. B. Phillips. (Min. Sci., Sept. 29, 1910; 3¼ pp., illus.) 20c.

13.779—MINING LAWS of Quebec and Ontario. Theo. F. Van Wageningen. (Min. and Sci. Press, Oct. 8, 1910; 2 pp., illus.) 20c.

13.780—NEW YORK—The Mining and Quarry Industry of New York State in 1909. D. H. Newland. (Bull. 142, N. Y. State Museum, Aug. 1, 1910; 96 pp.)

13.781—PERU—Mining in Quiruvilca, Province of Santiago De Chuco, Peru. F. M. Santolalla. (Min. Journ., Oct. 1, 1910; 1½ pp.) Abstract from *Boletín del Cuerpo de Ingenieros de Minas del Peru*. 40c.

13.782—PROSPECTING with Churn Drills at Miami, Ariz. H. A. Fuld. (Eng. and Min. Journ., Oct. 22, 1910; 2 pp., illus.) 20c.

13.783—PUMPING at Bisbee, Arizona. C. C. Austin. (Mines and Minerals, Oct., 1910; 2 pp., illus.) Describes the Junction plant of the Superior & Pittsburg Copper Company. 20c.

13.784—SAMPLING Low-grade and Irregular Orebodies. D. A. McMillen. (Eng. and Min. Journ., Oct. 15, 1910; ½ p.) 20c.

13.785—SHAFT SINKING—Ueber Schachtbetonierungen im allgemeinen und das Abteufen der Schächte bei der Oesterreichischen Berg- und Hüttenwerks-Gesellschaft. A. Czermak. (Oest. Zeit. f. B. u. H., Aug. 6, 13, 20, 27; Sept. 8 and 10, 1910; 22½ pp., illus.) \$2.

13.786—SHAFTS—Elliptical vs. Rectangular Shafts. Wm. Archie Weldin. (Mines and Minerals, Oct., 1910; 2½ pp., illus.) 20c.

13.787—TEXAS—Mineral Resources of Texas. Wm. B. Phillips. (Bull. 14, Texas Dept. of Agriculture, July-Aug., 1910; 44 pp., illus.)

13.788—TIMBER—Wood Preservation and Creosote Production. E. A. Sterling. (Eng. Rev., London, Sept., 1910; 4½ pp., illus.) 40c.

13.789—TIMBERING the Joplin District. Lucius L. Wittich. (Mines and Minerals, Oct., 1910; 2 pp., illus.) 20c.

13.790—TRANSPORT OF COAL AND ORE by Electric Traction. W. C. Brown. (So. African Inst. of Elec. Engrs., July, 1910; 13 pp., illus.) 60c.

13.791—TRANSPORTATION—Adapting Automobile Engines to Wagon Freighting. G. C. McFarlane. (Eng. and Min. Journ., Oct. 22, 1910; 1 p.) 20c.

13.792—TUNNELING on Los Angeles Aqueduct. R. L. Herrick. (Mines and Minerals, Oct., 1910; 8 pp., illus.) 20c.

13.793—UNWATERING—Peculiar Water Problem at Candelaria Mines. Geo. A. Laird. (Eng. and Min. Journ., Oct. 1, 1910; 1½ pp.) 20c.

13.794—UNWATERING FLOODED MINES. D. Lamont. (Eng. and Min. Journ., Oct. 1, 1910; 3¼ pp., illus.) 20c.

13.795—VENTILATION and Health Conditions on the Mines of the Witwatersrand, with Special Reference to the Ventilation System of the East Rand Proprietary Mines. S. Penlerick. (Journ. Chem., Met. and Min. Soc. of So. Africa, Aug., 1910; 12 pp., 1 pl., illus.) 60c.

13.796—WATER POWERS for Working Mines of Ontario. E. T. Corkill. (Annual Report, Ont. Bureau of Mines, 1910; Vol. XIX, Part I; 12 pp., illus.)

METALLURGY—GENERAL

13.797—ALLOYS—Some Common Defects Occurring in Alloys. Cecil H. Desch. (Metal Ind., Oct., 1910; 3¼ pp.) Paper before Institute of Metals. 20c.

13.798—ASHES AND SLAG HANDLING—Moderne Wegschaffung von Asche und Schlacke. (Oest. Zeit. f. B. u. H., Apr. 30, 1910; 1½ pp., illus.) 40c.

13.799—BRASS FOUNDRY COSTS and Statistics. Chas. R. Stevenson. (Am. Brass Founders' Assn., 1910; 35 pp., illus.)

13.800—CHIMNEYS—Some Notes on Power Station Chimneys. Kilburn Scott. (Iron and Coal Tr. Rev., Sept. 2, 1910; 2 pp., illus.) 40c.

13.801—METALLOGRAPHY—Apparatus for Microscopic Examination of Metals. Albert Sauveur. (Iron Tr. Rev., Sept. 8 and 15, 1910; 9 pp., illus.) 40c.

13.802—METALLURGICAL PRACTICE in Western Australia. A. E. Drucker. (Min. and Sci. Press, Sept. 24, 1910; 4¼ pp., illus.) 20c.

13.803—SMELTERY FUME in Shasta County, Cal. Sumner S. Smith. (Min. and Sci. Press, Sept. 17, 1910; 2 pp., illus.) 20c.

13.804—SMELTERY SMOKE—The Neutralization and Filtration of Smeltery Smoke. W. C. Ebaugh. (Journ. Indus. and Eng. Chem., Sept., 1910; 1½ pp.) 60c.

13.804a—SPEISS—Speisen und ihre Zugumachung. C. Guillemain. (Metallurgie, Oct. 8, 1910; 8 pp.) 40c.

13.805—TESTING—Integrity of Tests of Metals. Alexander E. Outerbridge. (Journ. Frank. Inst., Sept., 1910; 6½ pp.) 40c.

13.806—THERMIT PRACTICE in America in Welding, Casting and Metallurgy. E. Stutz. (Eng. News, Aug. 25, 1910; 3¼ pp., illus.) 20c.

MIXING AND METALLURGICAL MACHINERY

13.807—AIR COMPRESSION—Hydraulic Air Compression. (Mines and Minerals, Oct., 1910; 2¼ pp., illus.) Further particulars regarding hydraulic air compressor at Ragged Chutes, Canada. 20c.

13.808—AIR COMPRESSORS—Hydraulische Kompressoren. P. Bernstein. (Glückauf, Aug. 13, 1910; 3 pp., illus.) 40c.

13.809—COMPRESSED AIR—Friction in Small Air Pipes. E. G. Harris. Albert Park and H. K. Peterson. (Bull. School of Mines and Met., University of Missouri, Sept., 1910; 25 pp., illus.)

13.810—CONVEYERS. Henry J. Edsall. (Cassier's Mag., Oct., 1910; 20¼ pp., illus.) 40c.

13.811—DIGGING BUCKETS. Wm. C. Carrollton. (Ind. Mag., Sept., 1910; 11 pp., illus.) 40c.

13.812—DRILLING—Die Verwendung von Gesteinbohrmaschinen in den schwedischen Bergwerken. E. Mossberg. (Glückauf, Aug. 6, 1910; 12¼ pp., illus.) 40c.

13.813—ELECTRICAL EQUIPMENT for Metal Mines. R. W. Shoemaker. (Min. Sci., Oct. 6, 1910; 3 pp., illus.) Abstract of paper before Los Angeles Section A. I. E. E. 20c.

13.814—ELECTRIC POWER—Description of Transmission and Distribution Systems Supplying Current to Colorado Mining Districts. E. L. Bertrand. (Min. Sci., Oct. 6, 1910; 5 pp., illus.) 20c.

13.815—ELECTRIC POWER STATIONS—Die Kraftwerke der Kgl. Bergwerksdirektion zu Saarbrücken. Mengelberg and Peucker. (Glückauf, Aug. 27, 1910; 31 pp., illus.) 40c.

13.816—EXHAUST STEAM—Progress in the Use of Exhaust-Steam Power. J. Burns. (Iron and Coal Tr. Rev., Sept. 16, 1910; 4 pp., illus.) Paper before Instn. of Min. Engrs. 40c.

13.817—GAS ENGINES—The Development of Large Gas Engines. (Iron and Coal Tr. Rev., Oct. 14, 1910; 2½ pp., illus.) 40c.

13.817a—GAS PRODUCERS—Neuere Generatoren für bituminöse Brennstoffe. Gwosdz. (Glückauf, Sept. 17 and 24, 1910; 9½ pp., illus.) 40c.

13.818—HOISTING ENGINES—Ergebnisse von Untersuchungen an elektrisch und mit Dampf betriebenen Fördermaschinen. (Glückauf, Aug. 27, 1910; 2 pp.) 40c.

13.819—HOISTING ENGINES—Experiments with Steam and Electric Winding Engines. (Colliery Guardian, Sept. 30, 1910; 1¼ pp., illus.) From Glückauf. 40c.

13.820—HYDROELECTRIC PLANT of the Cobalt Power Company at Hound Chute. (Can. Engr., Oct. 13, 1910; 3¼ pp., illus.) 20c.

13.821—INDUCTION MOTORS—Selection and Types of Induction Motors. E. D. Brunner. (Trans. So. African Inst. of Elec. Engrs., Aug., 1910; 19 pp., illus.) 60c.

13.822—POWER PLANT—The Hampton Power Plant of the Delaware, Lackawanna & Western Railway Company, at Scranton, Penn. (Elec. Rev., Oct. 1, 1910; 3 pp., illus.) 20c.

13.823—POWER STATIONS—Die Kraftzentralen der Harpener Bergbau-Aktien-Gesellschaft. Schulte. (Glückauf, Aug. 20, 1910; 3 pp., illus.) 40c.

13.824—PUMPS—Modern Centrifugal Pumps, Their Construction and Characteristics. Geo. H. Gibson. (Practical Engr., Oct., 1910; 3½ pp., illus.) 20c.

13.825—REFRIGERATING PLANT—A Novel Refrigerating Plant at the Mines of Bethune, France. Alfred Gradenwitz. (Min. Wid., Oct. 15, 1910; 3 pp., illus.) 20c.

13.826—SAFETY APPLIANCES—Industrial Safety and the Prevention of Accidents. William H. Tolman. (Iron Tr. Rev., Sept. 15 and 22, 1910; 7¼ pp., illus.) 40c.

13.827—STEAM TURBINES—Horizontal Steam Turbines of Moderate Output. Frank C. Perkins. (Min. Wid., Oct. 1, 1910; 2 pp., illus.) 20c.

13.828—TURBINE STATION of the Bisbee Improvement Company. I. A. Rosok. (Elec. Wid., 4 pp., illus.) Results obtained in the operation of a small Arizona oil-burning plant, with details of losses and their distribution. 20c.

13.829—WATER POWER—Effect of the Length of Penstock on the Weight of Revolving Parts of a Water-Wheel Unit. George M. Peek. (Eng. News, Aug. 11, 1910; 1 p.) 20c.

SAMPLING AND ASSAYING

13.830—ANTIMONY AND TIN DETERMINATION—A Rapid Practical Method for the Determination of Antimony and Tin in Alloys such as Babbitts and Solders. W. B. Vietz. (Metal Ind., July, 1910; 1¼ pp., illus.) 20c.

13.831—ASSAY FURNACE—A Two-Muffle Oil-Burning Assay Furnace. J. E. Collier. (Pacific Miner, Sept., 1910; 1½ pp., illus.) 20c.

13.832—ASSAY LABORATORY—Labor-Saving Appliances in the Assay Laboratory. Edward Keller. (Bull. A. I. M. E., Aug., 1910; 3 pp., illus.)

13.833—ASSAY RETURNS—Uniformity in the Writing of Assays. A. L. Pellegrin. (Pacific Miner, July, 1910; 1 p.) 20c.

13.834—BARIUM SULPHATE—Studies on Colloidal Barium Sulphate. Yagoro Kato. (Memoirs, College of Sci. and Eng., Kyoto Imperial Univ., Vol. II, No. 7, 1910; 28¼ pp., illus.)

13.835—CUPELS—Experiments with Portland Cement Cupels. T. P. Holt and N. C. Christensen. (Eng. and Min. Journ., Sept. 17, 1910; 2 pp., illus.) 20c.

13.836—ELECTROCHEMICAL ANALYSIS—The Rapid Determination of Copper. R. C. Benner. (Journ. Am. Chem. Soc., Oct., 1910; 7 pp.) 80c.

13.837—GOLD AND SILVER DETERMINATION—Gold and Silberbestimmung im Schwarzkupfer. Nissen. (Chem. Zeit., May 24, 1910.) 20c.

13.838—LEACHING TESTS—A Handy Appliance for Leaching Tests. O. E. Jager. (Eng. and Min. Journ., Oct. 22, 1910; 1 p., illus.) 20c.

13.839—LEAD IN NONFERROUS ALLOYS. The Determination of. C. P. Karr. (Am. Brass Founders' Assn., 1910; 8½ pp.)

13.840—TIN-ANTIMONY ALLOYS—The Analysis of Tin-Antimony Alloys. LeRoy W. McCay. (Journ. Am. Chem. Soc., Oct., 1910; 7 pp.) 80c.

13.841—VANADIUM AND CHROMIUM—The Application of Potassium Ferri-cyanide in Alkaline Solution to the Estimation of Vanadium and Chromium. Howard E. Palmer. (Am. Journ. of Sci., Aug., 1910; 5 pp.) 40c.

INDUSTRIAL CHEMISTRY

13.842—AMMONIA—Production of Ammonia by Synthesis. Alfred Gradenwitz. (Eng. and Min. Journ., Sept. 10, 1910; ¾ p., illus.) 20c.

13.843—LIGHTING CHEMICAL WORKS—Electric Light in the Chemical Works. Warren H. Miller. (Chem. Engr., Sept., 1910; 4 pp., illus.) Deals with equipment used by Bergenport Chemical Works, a large sulphuric acid plant. 40c.

13.844—SULPHURIC ACID—Pyrite Smelting and Sulphuric Acid Manufacture. F. J. Falding and J. Parke Channing. (Eng. and Min. Journ., Sept. 17, 1910; 3½ pp., illus.) 20c.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

ABRASIVES—

Table of abrasives including Carbons, good drill quality, carbets, Carborundum, f.o.b. Niagara, Falls, powd., Grains, Corundum, Crushed Steel, f.o.b. Pittsburg, Emery, in kegs; Turkish flour, Grains, Naxos flour, Grains, Chester flour, Grains, Peekskill flour, f.o.b. Easton, Pa., Grains, in kegs, Garnet, per quality, sh. ton, Pumice Stone, Am. Powd., 100 lb., Italian, powdered, per lb., Lump, per quality, Rottenstone, ground, Lump, per quality, Rogue, per quality, Steel Emery, f.o.b. Pittsburg.

ACIDS—

Table of acids including Acetic 28%, Boric, Hydrofluoric, 30%, 48%, 52%, 60%, Hydrochloric acid, 20° per 100 lb., Nitric acid, 36° to 40°, per lb., Sulphuric acid, 50°, bulk per ton, 60°, 100 lb. in carboys, 60°, bulk, ton, 66°, 100 lb. in carboys, 66°, bulk, ton, Oxalic, chem. pure.

ALCOHOL—Grain 95%....gal.

Table of alcohol: Denatured, Refined wood, 95@97%.

ALUM—Lump.....100 lb.

Table of alum: Ground, Chrome Alum.

ALUMINUM—Sulphate, com'l. lb.

Table of aluminum sulphate: 24 deg. lb., 26 deg. lb.

AMMONIUM—

Table of ammonium compounds: Bromide, Carbonate, Muriate grain, Lump, Sulphate, 100 lb., Sulpho-cyanide com., chem. pure.

ANTIMONY—needle, lump. lb.

Table of antimony: Oxide.

ARSENIC—white.

Table of arsenic: Red, Outside brands, Saxony.

ASPHALTUM—

Table of asphaltum: Barbadoes, West Indies, Egyptian, Gilsomite, Utah ordinary per ton, Trinidad, California.

BARIUM—

Table of barium: Carb. Lump, 80@90% lg. ton, Precipitated, 96@98%, Powdered, natural, Chloride com'l., Nitrate powdered, in casks, Blanc Fixe, dry, bbl. per lb.

BARYTES—

Table of barytes: Am. Ground, Floated, Foreign floated.

BLEACHING POWDER—35% 100 lb.

Table of bleaching powder.

BLUE VITRIOL—(copper sulphate), carload, per 100 lb.

Table of blue vitriol.

BONE ASH.....lb.

Table of bone ash.

BORAX, sacks.....

Table of borax.

CALCIUM—Acetate, gray, 100 lb.

Table of calcium: Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J., Chloride, f.o.b. N. Y., Cement—Slag cement, Portland, Am. 500 lb., Foreign, "Rosendale," 300 lb. (in sacks).

CHROME ORE—

Table of chrome ore: New Caledonia 50% ex. ship N. Y., Bricks, f.o.b. Pittsburg, per M.

CLAY, CHINA—Am. common

Table of clay, china: ex-dock, N. Y., Foreign.

COBALT—Oxide.....lb.

Table of cobalt oxide.

COPPERAS—Bulk.....100 lb.

Table of copperas: In bbls., In bags.

CRYOLITE (carload).....lb.

Table of cryolite.

FELDSPAR—Ground..sh. ton.

Table of feldspar.

FIRE BRICK—

Table of fire brick: American, Imported, St. Louis, Extra, Special extra, FIRE CLAY—F.o.b. St. Louis, St. Louis, extra quality per ton, ordinary.

FLUORSPAR—

Table of fluor spar: Domestic f.o.b. Pittsburg: Lump, Ground, Foreign crude ex. dock, FULLER'S EARTH—Lump, 100lb., Powdered.

GRAPHITE—Ceylon.

Table of graphite: Flying dust, finest to best, Dust, Chip, Lump, Large lump.

GYPSSUM—

Table of gypsum: Fertilizer, Ground.

INFUSORIAL EARTH—

Table of infusorial earth: Ground Am. Best, German.

LEAD—Acetate (sugar of) brown,

Table of lead acetate: Nitrate, com'l.

MAGNESITE—Greece.

Table of magnesite: Crude (95%), Calcined, powdered, Brick, domes, per qual. f.o.b. Pittsburg.

MAGNESIUM—

Table of magnesium: Chloride, com'l., Sulphate (Epsom salt).

MANGANESE—

Table of manganese: Foreign, crude, powdered: 70@75% bin oxide, 75@85% bin oxide, 85@90% bin oxide, 90@95% bin oxide, Ore, 80%-85%.

MARBLE—Flour.....sh. ton.

Table of marble flour.

MINERAL WOOL—

Table of mineral wool: Slag, ordinary, Selected, Rock, ordinary.

MONAZITE SAND—

Table of monazite sand: Guar, 97%, with 5% Thorium oxide, normal.

NICKEL—

Table of nickel: Oxide, crude, lb. (77% for fine metal contained), Sulphate, single, Sulphate, double.

NITRATE OF SODA—

Table of nitrate of soda: 100 lb. 95%, 95% for 1910, 96% is 2@7 1/2 c. higher per 100 lb., OZOKERITE—best.

PAINTS AND COLORS—

Table of paints and colors: Litharge, Am. powdered, English glassmakers, Lithophone, Metallic, brown, Red, Ocher, Am. common, Best, Dutch, washed, French, washed, Paris green, pure, bulk, Red lead, American, Foreign, Turpentine, spirits bbl., per gal. White lead, Am., dry, American, in oil, Foreign, in oil, Zinc white, Am. extra dry, French, proc's, red seal, dry, French, process, green seal, dry.

PHOSPHATES—Acid..... 55@60c. per unit

Table of phosphates: Fla., hard rock 77%, land pebble 68%, Tenn., 78@80%, 75%, 68@72%, So. Car. land rock 60%, F.o.b. Florida or Georgia ports, Pelasant. On vessel Ashley River, S. C.

POTASSIUM—

Table of potassium: Bicarbonate crystal, Powdered or granulated, Bichromate, Am., Scotch, Bromide, Carbonate (80@85%), Caustic, ordinary, Elect. (90% KOH), Chloride (muriate), 100 lb., Chlorate, powdered, Crystals, Cyanide (98@99%), Carloads (30,000 lb.), 5-ton lots, Less than 5 tons, Kainite, long ton, bulk, 7.50; bags, Permanganate, Prussiate, yellow, Red, Sulphate (basis 90%) 100 lb.

PYRITE—

Table of pyrite: Domestic, non-arsenical, furnace size, f.o.b. R. R., Domestic, non-arsenical, fines, per unit, f.o.b. mines, Imported, non-arsenical, furnace size, ex-ship, per unit, Imported, arsenical, furnace size, ex-ship, per unit, Imported fines, arsenical, ex-ship, per unit, Imported fines, non-arsenical, ex-ship, per unit, Pyrite prices are per unit of sulphur. A deduction of 25c. per ton is made when ore for furnace is delivered in large lumps.

SALT—N. Y. com. fine 280 lb. bbl.

Table of salt: N. Y. agricultural, Salt PETER—Crude, 100 lb., Refined, crystals.

SILICA—

Table of silica: Ground quartz, ord'ry, lg. ton, Silex, ground, Silex, floated, Lump quartz, Glass sand.

SILVER—Nitrate, crystals...oz.

Table of silver nitrate.

SODIUM—Acetate.....lb.

Table of sodium: "Alkali," per 100 lb., 58/48, Bicarb. soda, per 100 lb., Soda, caustic, per 100 lb., 78/60, Soda, caustic, powdered, Salt cake, per 100 lb., bulk, Salt cake, bbl., Soda, monohydrate, per lb., Bichromate, Bromide, Chlorate, com'l., Cyanide, 120-130% KCN, per 100%, Carloads (30,000 lb.), 5-ton lots, Less than 5 tons, Hyposulphite, Am., Phosphate, 100 lb., Prussiate, Sal soda, f.o.b. N. Y., Foreign, f.o.b. N. Y., Silicate, com'l., Sulphate, com'l. (Glauber's salt), Sulphate, com'l., calcined.

STRONTIUM—Nitrate.....lb.

Table of strontium nitrate.

SULPHUR—Louisiana (prime) to

Table of sulphur: New York, To Boston, Philadelphia or Baltimore, Roll, Flour, Flowers, sublimed, Powdered commercial, bags Sicilian, extra qual., unmixed seconds, crude brimstone to New York.

TERRA ALBA—Fr. & Eng. 100 lb.

Table of terra alba: French, Italian, best.

TIN—Bi-chloride, 50°.....lb.

Table of tin: Crystals, Oxide, lb.

URANIUM—Oxide.....

Table of uranium oxide.

ZINC—Chloride sol., com. 20°.....

Table of zinc: Chloride granular, Dust, Sulphate.

NOTE—These quotations are for ordinary wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. In the cases of some of the important minerals, such as phosphate rock, pyrites and sulphur, in which there are well established markets, the quotations are substantially representative. But in the cases of some of the minor mineral products, the quotations represent what dealers ask of consumers and not what producers can realize in selling their output as a matter of private contract.

Mining and Metallurgical Companies—U. S.

Table with columns: NAME OF COMPANY AND SITUATION, SHARES (Issued, Par Val.), DIVIDENDS (Total to Date, Latest Date, Amt.). Lists companies like Alaska Mexican, Alaska Treadwell, etc.

Coal, Iron and Other Industrials—United States

Table with columns: NAME OF COMPANY AND SITUATION, SHARES (Issued, Par Val.), DIVIDENDS (Total to Date, Latest Date, Amt.). Lists companies like Amer. Ag. Chem., American Cement, etc.

*Since 1894. †Since 1907. ‡Since 1890. zStock div. \$6,130,000 Mar. '09. yStock div. \$2,866,950 Jan. '10. z Stock div. 10 per cent. Mar. '10.

Canada, Mexico, Central and South America

Table with columns: NAME OF COMPANY AND SITUATION, SHARES (Issued, Par Val.), DIVIDENDS (Total to Date, Latest Date, Amt.). Lists companies like Amistad y Conc'rdia, Batopilas, etc.

†Since reorganization. ‡Previous to Jan., 1910, \$324,644.

Divided previous to consolidation. *\$1,436,250. †\$11,187,500.