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PUBLISHED WEEKLY

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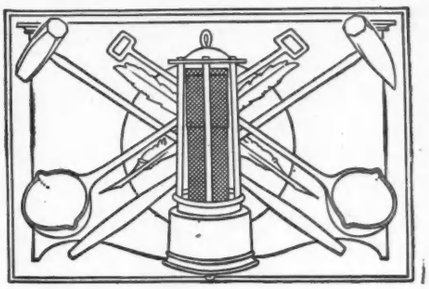

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CIRCULATION STATEMENT

During 1909 *we printed and circulated* 534,500 *copies of* THE ENGINEERING AND MINING JOURNAL.

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June 4..... 13,500
June 4..... 9,500

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Contents

The Economic Situation

The great event of the past week has been the action of the Government in enjoining the railways from increasing freight rates, which precipitated a sharp decline in the stock market and revived the feeling of pessimism, previously lulled. The railway policy had been inspired by the increased cost of operating, chiefly because of advance in wages. It was deduced naturally that if the railways could not offset this by higher charges, they could not buy so much material for improving their facilities, and diminished demand would follow down the line to crude iron, copper and other raw material. The compromise later effected between the President and some of the railways does not greatly alter this view.

Outside of Wall Street, the action of the administration is doubtless popular, but there is something to be urged in behalf of the railways. The latter owe a duty to the public, whose franchises they enjoy, but competitively they are in a different position from the manufacturers, and it is difficult to see how they can establish rates without some agreement among themselves. Respecting the railway rates that have ruled during recent years, there is much to be said on both sides. A scientific analysis would possibly disclose that upon certain kinds of freight, especially the classified freight, rates have been too high; while upon commodity rates they have probably been, in general, too low. There ought to be a legal method for reconciling the interests of the public and the railways in the adjustment of railway rates. This is in view in the bill now pending before Congress.

The recent move of the railways toward increased rates was based upon the greater cost of operation, resulting from a bad economic situation. The policy adopted by them, however, will not lead to any good end in the long run. The continuous increase in the cost of living is bound to have disastrous consequences, although the evil day may be postponed. Safety lies in the other direction, namely toward economy. The railways, along with many manufacturers, made a mistake when recently they advanced wages.

We begin now to see more clearly what has been the commercial trouble in this country during the first half of 1910. We have been suffering from the consequences of extravagance and speculation, the latter in land, stocks and commodities. The speculation in land turns out to have been much greater than was supposed, and nothing locks up capital so much as land speculation. These conditions produced a bad situation in our international trade and absorbed the money required to increase railway facilities and make other necessary improvements. We were, therefore, obliged to borrow from abroad upon onerous terms.

The remedies for the present situation are economy and liquidation. This has been the meaning of the liquidation that began last January in the stock market, and lately has been in evidence in the commodity markets. The corrective having been thus applied, our commerce has been coming down to a sounder basis. The Washington action of last week was

instrumental in hastening liquidation, but was not a fundamental cause.

In the latest gloom of pessimism there have been forebodings of a crisis. This, however, is ultra-pessimistic. The conditions at present differ materially from those in 1907. A bad situation then was of worldwide existence. Europe could offer no help to us because it also was in trouble, but now Europe can help, at a price.

In looking toward the future, let it not be forgotten that this is a great country, whereof the annual savings amount to upward of five thousand million dollars, which is an immense recuperative ability. The outlook for the crops in 1910 is so far excellent, and after mid-summer it is to be expected that a great flood of wealth, scattering its effect over all industries, will begin to move eastward.

Iron Making in China

It has been long known to engineers and explorers that China possesses important deposits of iron ore and coal, and that with improved economic conditions and modern machinery the country might some day take an important position in the iron markets of the world. Until a few years ago, however, these resources were utilized only to a very limited extent and after very primitive methods. It is a matter of much importance, therefore, that a beginning has been made in the manufacture of iron and steel by approved modern methods, and on a large scale. It is also important that the work, though directed by Belgian and German engineers, has been financed by Chinese capital, wealthy Chinese merchants having recognized its value and having been willing to invest their money in the enterprise.

The article on another page, describing the iron and steel works at Hanyang, gives an account of a plant consisting of blast furnaces of the latest German type, with steel furnaces and rolling mills which turn out rails of excellent quality and other finished steel. The methods used are not different from European or American practice, except that more hand labor is employed than in our works, owing to the cheapness of labor. For that reason also the labor costs are extremely low through the whole process from the mining of the ore to the final outturn of the finished steel. The high quality of the ore and its abundant supply are also elements which will be of importance in future calculations.

Already this development may be said to have an effect upon our own iron trade apart from the fact that it is supplying Chinese railroad builders with material which they were formerly obliged to import. Last year 60,000 or 70,000 tons of basic pig iron were brought to New York, on a low freight rate, and sold here at a price which was said to return a good profit to the makers. A few months ago the Western Iron Corporation, of Seattle, made a contract with the Hanyang works for pig iron, the quantity running from 36,000 tons the first year up to a maximum of 200,000 tons in the 15 years covered by the agreement. This pig is to be used, with pig from Washington ores, in making steel at Irondale; and it is to be supplied at a cost much lower than that at which iron from the Eastern States can be delivered on the Pacific Coast. Moreover, the Western company will take 100,000 tons a year of the Hanyang ores for its blast furnaces. The shipment of iron to the United States from China is a new and surprising feature in the trade.

It is easy to believe that this is only the beginning of a great development. Based on the abundance of raw material and the supply of cheap labor, it may readily become of great interest to the ironmasters of Europe and America.

Regulating Production of Potash Salts

The law which passed the German Reichstag recently in relation to the potash-salts question, appears from advance notes of its contents so far received to be a peculiar piece of special legislation. It was passed by a combination of the high Agrarian, or extreme conservative, party and the Socialists, a rather unusual coalition. The Imperial government had already assumed the control of the potash-salts industry, and this bill establishes the rules for its conduct.

The old Kali-Syndikat, composed of the mine operators, including the Prussian government, which owns large mines, is set aside. All the mines are placed under the direct control of the Bundesrath, or Imperial Council, and that body will allot to each the quantity which it may produce, though later it may delegate the allotment to a committee. If any mine should produce more than its allotment, it must pay a tax of 16 marks—$3.81—per 100 kg. on the excess, which is practically prohibitory. A special amendment, however, was made to this clause, providing that where the production is made to fill contracts now existing, the tax may be reduced to such an amount that the total price shall not be in excess of the price prevailing on June 30, 1910. This amendment was made at the instance of the foreign minister, and it is said that it was the result of representations made by the United States on behalf of the American holders of large contracts.

The operators of mines are closely held down, not only on production, but also on prices. The bill fixes prices which may be charged, the range for salts sold in Germany being 10 to 15 per cent. below the old syndicate prices. This is accompanied by a strict prohibition of the sale of any salts for export at lower prices than are charged for home consumption.

Further, the bill provides that operators must retain the present scale of wages paid to miners. If any mine should reduce wages without the consent of the Bundesrath, its allotment may be cut off. This clause seems to have been inserted to secure the Socialist vote. The only consolation the mine operators have, apparently, is that they are secured against competition; for the law provides that if any new mines are opened, they must wait five years at least before they can receive an allotment. The provisions of the law, of course, indicate that the mines will be under close government supervision, both as to operation and sales.

This seems to be the climax of governmental regulation of private industry. Our own trust magnates will look with envious eyes upon so perfect a system of throttling competition.

The curtailment of pig-iron production has been, after all, less than the current reports had it. The June report shows only 14 fewer furnaces in blast than on May 1; and the estimated make of iron in May was only 100,000 tons less than in April. The effect on the market was greater than the reality warranted.

CORRESPONDENCE and DISCUSSION

Views, Suggestions and Experiences of Readers

Cactus Copper Company

We have received the following despatch from Gay & Sturgis, Houghton, Mich.:

In the editorial in the JOURNAL of June 4, entitled "Cactus Copper Company," several allusions are so obviously directed at our house that it is incumbent upon us to reply. Unfortunately for us, as we see it, the criticisms hit hardest where the people hit are innocent. The principal foundation for your criticisms is based on a forged telegram published Jan. 28, 1910, containing outlandish statements alleged to have come from our representatives who were then visiting the Cactus property. Consulting Engineer Pritchett denied these statements in a Globe newspaper, Feb. 1, and as we maintain our own weekly mining review in which our clients and others may find a correct version of our statements, we did not feel obligated to issue a denial of this spurious message. We ask the JOURNAL to satisfy itself concerning these facts, which can readily be done, and in its next issue to remove the stigma placed upon us by the editorial. Every statement we have made regarding Cactus has been obtained from authoritative sources and in each case has been tacitly endorsed by the entire management.

Early in 1909 the Cactus Copper Company was organized, and in December of the same year we underwrote $225,000 worth of this company's stock, which simply took over the assets of the Cactus Development Company and provided a sufficient sum for conducting the work recommended by the consulting engineer, C. W. Pritchett. The details of this were all laid before the stockholders in a circular letter. Hence there is no excuse for veiled allusions to corrupt financing. We hope the JOURNAL will take immediate steps to investigate thoroughly all statements we have ever made concerning this company and its property. We are confident it will then find that it has done us a great injustice; for while our name was not mentioned, the reading public will point us out as the object of attack.

We have received the following telegram this morning from Mr. Pritchett: "Denver, Colo., June 6-7, 1910. Your telegram of today received. While at the Cactus property recently, President Eaton instructed me to write full report on conditions and prospects there. Expect to have this completed by last of this week. Think report will cover the ground fully. C. W. Pritchett."

President Eaton has telegraphed to our Boston office the following statement: "Duluth, Minn., June 7, 1910, Gay & Sturgis, Boston, Mass.: The prospects of Cactus becoming a great mine were never brighter than today. Mr. Pritchett, our consulting engineer, has just left the property and has expressed himself as highly pleased with the outlook. The company has options on 42 claims adjoining the old group on the north. We now are owning and controlling about 1400 acres. Every statement made by Gay & Sturgis concerning the Cactus which has come to my notice has been conservative and well within the facts. W. A. Eaton, President."

The foregoing is respectfully submitted.

GAY & STURGIS.

Houghton, Mich., June 7, 1910.

[We made no charges against anyone respecting this company, but it is on record that specific statements as to the development of this mine have been circulated widely and these statements have not been confirmed by any published report of the company's engineer, although the company has been urged to make such a report, and has repeatedly promised to do so. Its failure to fulfil this promise was the point of our criticism.—ED.]

Consular Reports

The new federal mining department could expend some effort usefully in editing the consular reports. The issue of Jan. 3, 1910, contains a report by the consul-general at Winnipeg, on a gold process invented by George Thurber. He says, in part, "The ore * * * * is treated with a chemical solution, the formula of which is kept a secret pending the granting of a patent. * * * The process is claimed to be applicable to mines now working by merely substituting this process for the copper process (sic). According to the report of recent experiments, ore, which when submitted for assay to two of the best offices in Canada was reported by one as having no trace, and by the other as having only 70c., gave a test by this process of $14.50 to the ton."

Another report enthusiastically describes the placer mines of Bolivia as being a field for heavy dredges, but ends by admitting the impossibility of taking a modern dredge into the mountains over trails. A third report describes an automobile factory in France which covers 6000 acres and employes 1000 men—or six acres to the man. A large portion of the trade reports urge the American manufacturer to sell f.o.b. the customer's port or even on consignment, forgetting the enormous increase in capital which the latter course would require.

Such statements as the following constantly appear, and it is these which cause the reports to be held in less esteem than they deserve:

"A merchant in a European country will be glad to exhibit American pianos if sent him on consignment."

"A merchant in Bagdad will be glad to sell American agricultural machinery if delivered to him f.o.b. his city, and will pay for the machinery as he sells it."

"American machinery trade would be increased in China greatly if the manufacturer would conform, in his designs, to local customs." Apparently this last consul has no conception of the meaning of the words "standard designs" as employed in manufacturing. The low prices now quoted on American products are largely due to standard designs and prices would be much higher if designs were changed to suit every whim of the customer. Instead of the designs being suited to the customer, the customer must be educated to the point of accepting the American designs and admitting their superiority over his own crude, inexperienced ideas.

Another consul wants the names of American firms which manufacture apparatus for utilizing the energy of the sun's rays for generating and storing electricity. Someone is "playing horse" with the consul.

There is a vast amount of valuable information in the consular reports, but in each case, one must be sufficiently posted on the particular locality covered, to judge of the accuracy of the information given. A Mexico City consul recently described that city as offering a good opportunity for American tailors, giving as reasons, the high prices and poor fits of the tailors now there. I know that, while American ready-made clothing is somewhat higher than in the States, the local tailors can duplicate in fit and quality American made-to-order suits for half the New York cost.

MARK R. LAMB.

Milwaukee, Wis., May 24, 1910.

The New Bureau of Mines

SPECIAL CORRESPONDENCE

The expenses of the Bureau of Mines, as planned for the coming fiscal year, are as follows: General expenses and salaries, $54,000; removing and equipping offices and laboratories, $14,700; contingent expenses, $7000; stationery, $3500; library, $1000; rent of buildings, $12,500; printing and binding, $29,000; total, $121,700. The law provides that the publications of the Bureau of Mines are to be published in such editions as recommended by the Secretary of the Interior, but not to exceed 10,000 copies for the first edition. Whenever the edition of any of the publications of the Bureau of Mines shall have become exhausted and the demand for it continues, there are to be published as many additional copies as the Secretary of the Interior may deem necessary.

Comptroller Tracewell of the Treasury Department has been consulted about the dividing of the appropriation for the printing and publishing of reports and for general administrative purposes between the Geological Survey and the Bureau of Mines.

The appropriations as above set forth have been accepted and have been incorporated into the sundry civil bill which has passed the House of Representatives. All the technological work and its appropriations have been transferred in that bill to the Bureau of Mines, and in addition the work of mine inspection in the Territories has been turned over to the new bureau. In the Senate an effort will be made to expand the work of the bureau still further and to give it more money.

Guanajuato Consolidated Mining and Milling Company

A detailed report of the Guanajuato Consolidated Mining and Milling Company for the year 1909 states that the fluctuations in the company's business were greater than during the preceding year. The net profits given by quarters, after deducting the cost of development and incidental expenses, are: $15,000; $43,000; $52,500, and fourth quarter $41,000. This falling-off in earnings continued during the first quarter of the current year, when the profits were reduced to $24,000.

The foregoing figures are net as regards the business in Mexico, but are subject to a charge for the New York office expenses, salaries, transfer agents, legal expenses and corporation taxes at the rate of $18,000 per year, and the annual interest on outstanding bonds amounting to $12,000. The fluctuations in the result of the operations at the mine were due more to changes in the value of the ore and other local conditions than to the fluctuations in the price of silver.

Development work during the year amounted to 4731 ft. About one-half of this was on the eighth level. Ore blocked out amounts to 188,500 tons. Total ore mined during the year, 116,518 tons; dry tons to mill after sorting, 86,580, averaging 12.955 oz. silver and 0.05417 oz. gold and valued at 15.68 pesos per ton. Total recovery, silver 95.04 and gold 96.26 per cent. Cost of mining, milling and cyaniding, $360,208, or $4.16 per dry ton milled, not including the interest and general office charges.

Joseph Smith Harris

Joseph Smith Harris, for many years a prominent figure in the anthracite industry, died suddenly at his home at Germantown, Penn., June 2, aged 74 years. He was born in Chester county, Penn., educated in the Philadelphia public schools, and served his apprenticeship as a civil engineer on the Pennsylvania Railroad. In 1854 he was appointed an assistant in the United States Coast Survey and continued in that capacity 10 years, serving in Kentucky and on the northwestern boundary; incidentally he was for a time in command of a steamer in Admiral Farragut's Mississippi squadron during the Civil War.

In 1864 he opened an office at Pottsville, Penn., as a civil and mining engineer, and soon made himself prominent in connection with the survey and planning of coal-mining operations. In 1870 he was appointed engineer of the Philadelphia & Reading Coal and Iron Company, holding that office seven years. From 1877 to 1880 he was superintendent and engineer of the Lehigh Coal and Navigation Company; after two years as general manager of the Central Railroad of New Jersey, he returned to the Lehigh company as president, and remained with it from 1882 to 1892. During that time he served also for three years, 1886-1889, as one of the receivers and afterward vice-president of the Central Railroad of New Jersey. In 1892 he was chosen vice-president of the Philadelphia & Reading; in the following year he was appointed by the court one of the receivers of that company. When the company was reorganized in 1896, he was chosen president of the Reading Company, the new holding company, and was also president of its two subsidiary corporations, the Philadelphia & Reading Railroad Company and the Philadelphia & Reading Coal and Iron Company. He held those positions for five years, and in 1901 finally retired from business. He spent his remaining years in the study of the history of his native State, which had always attracted him, though his busy life had left him little time for such work.

As engineer and afterward president of the Lehigh Coal and Navigation Company Mr. Harris thoroughly reformed the business and operations of the "Old Lehigh" on modern lines, doing away with the rather antiquated methods of mining which had come down from the earliest days of the anthracite industry. As receiver of the New Jersey Central and afterward of the Reading he carried those companies through the difficult period of bankruptcy. He was the only president in the long history of the Reading who was an engineer and not a lawyer or financier.

Mr. Harris married in 1865 Delia Lillian Brodhead, who survives him, with three daughters and a son. He was a member of the American Philosophical Society and the Pennsylvania Historical Society. From Franklin & Marshall College he received, in 1903, the degree of doctor of science. Mr. Harris was made in 1889 a trustee of the University of Pennsylvania. He was the author of several published works on the local and genealogical history of Pennsylvania.

Annual Report of Butte Coalition

The report of the Butte Coalition Mining Company for the year ended Dec. 31, 1909, includes a report by T. F. Cole, president of the company, under date of June 1, 1910, and a letter from A. C. Carson, general manager, telling of the development and operation of the company's mines from May 31, 1909 to March 31, 1910.

PROPERTIES PASS TO ANACONDA COMPANY

The president, in his report, states that in March, 1909, the company purchased 3000 shares of the capital stock of the International Smelting and Refining Company at the par value of $100 per share. The mines operated during the year were those of the Red Metal Mining Company, the Alice Gold and Silver Mining Company's workings being practically idle during the entire year.

At the meeting of the stockholders of the Red Metal Mining Company, held in April, 1910, a proposal was made to sell and dispose of all the assets of the company to the Anaconda Copper Mining Company for 500,000 shares of the latter company's capital stock. The advisability of this sale was investigated by two members of the board of directors who were not in any way connected with the Anaconda company. One of these is a mining engineer in active practice. It was deemed advisable to accept the proposal and the transfer of the properties took place as of March 31, 1910. The present dividend rate of the new stock is equivalent to that of the Red Metal company, for which it was traded.

At a stockholders' meeting held at Salt Lake on March 27, 1910, the direc-

tors of the Alice Gold and Silver Mining Company also agreed to transfer their assets and property to the Anaconda Copper Mining Company for 30,000 shares of stock in the latter company. By these two trades the Anaconda company obtained complete control of all the properties and assets of the Red Metal Mining Company and the Alice Gold and Silver Mining Company.

Manager Summarizes Work Done

The manager's report shows that during the period Jan. 1 to Dec. 31, 1909, the mines of the company produced 591,737 tons of ore, from which payment was received for 33,438,490 lb. copper, 594,626.11 oz. silver and 4059.514 oz. gold. The total development work done by the Red Metal company is stated as 19,186 lineal feet. During the period May 31, 1909 to March 31, 1910, 5297 ft. of development work was done in Rarus mine, 9405 ft. in the Minnie Healy, 4484 ft. in the Tramway mine.

In the Minnie Healy the production was raised in five months' time, after the completion of the Tramway shaft and surface plant, from 200 tons to 700 tons per day. At the end of the period covered in the report, the output was 1200 tons per day, and the output per man per day had reached 2.35 tons. This is claimed to be the highest figure for the company's operations. The Tramway mine is said to have been put on a paying basis during this year, the average grade of the ore in all veins being 130 lb. gross to the ton. The mining cost is stated to be high at the Tramway. During the year the Rarus shaft was sunk to the 2200-ft. level and the Tramway to the 2000 ft.; 750 men were employed in the mines.

Balance Sheet

The balance sheet of the Butte Coalition Mining Company, on Dec. 31, 1909, showed the assets of the company to be $15,257,239. The liabilities were at the same time stated to be 1,000,000 shares of capital stock authorized and issued, valued at $15,000,000; accounts payable, $110,504 to the Red Metal Mining Company, and miscellaneous sums amounting to $3121. The surplus was $393,613, made up of the 1909 balance of $80,486, and $313,126, net income for the year. There was paid in dividends, $250,000. The total income for the year was $342,156; expenses, $29,029. No figures are given from which any idea of the operating costs can be gained.

The auriferous area along the river Ili, about 70 versts to the south of Kiachta, is reputed to be the richest in Mongolia. A number of unusually large nuggets have been found in the river fords.

Report of United Copper Company

F. A. Heinze, president of the United Copper Company, has just made his annual report to the stockholders. He summarizes the holdings of the company, giving figures as to the intrinsic value of each. Data referring to the Ohio Copper Company are summarized elsewhere in this issue.

Stewart Mine

Through the Montana Ore Purchasing Company, the United company is quoted as controlling the Stewart Mining Company, capitalized at 1,250,000 shares of $1 par value each. The Montana Ore Purchasing Company owns 673,250 of the 1,013,262 shares issued by the Stewart company. The situation of the Stewart property is given as being in the immediate vicinity of the Bunker Hill & Sullivan mine and the Federal Mining and Smelting Company's property. The ore is a silver-lead one. The Stewart company has leased the Mammoth mill of the Federal company at a rental which will not exceed $1100 per month. The mill has a daily capacity of 500 tons, and working on dump ore from the mine is at present producing concentrates assaying 52 to 55 per cent. lead and 34 to 37 oz. silver, with 6:1 concentration. The property is estimated as having a value of $15,000,000, according to a report of an unnamed expert.

Coal Holdings

The United company is stated to be a two-thirds owners of the capital stock of the New York & Pittsburg Coal Company, and through the Montana Ore Purchasing Company to hold a first mortgage of $600,000 on this property, comprising approximately 10,000 acres in Washington county, Penn., and underlaid by the "Pittsburg seam." The situation of the property is given as 32 miles from Pittsburg, in the immediate vicinity of the Pittsburg-Westmoreland Coal Company's property and of that of the Pittsburg-Buffalo company.

Property in Butte and Vicinity

The Lexington mine in Butte, according to Mr. Heinze, is also controlled by the United company, through the La France Copper Company. The property is developed by a three-compartment shaft to a depth of 1465 ft. It is estimated that 246,000 tons of ore, averaging $28.20 gross value per ton, are developed in the main Lexington orebody. The ore is refractory, but Mr. Heinze states that he has been assured by Beer, Sondheimer & Co., that a recovery of 60 per cent. of the gross value can be made with the milling facilities at present available to the company. According to the same authority, a 70 per cent. recovery should be made with the proper equipment. The ore is said to become more zinky in character with depth.

The Basin Reduction Company, another asset of the United company, has a mill with a capacity for copper ores of 1500 tons daily, a mill site, and valuable water rights, etc. This mill is at present doing custom concentrating work and is beginning the treatment of Lexington ore. The other mining holdings of the United Copper Company are 13 "Danielsville" claims, approximately 260 acres, situated in Deer Lodge county, and about 200 acres on the "porphyry dike," about seven miles south and west of Rimini, Mont. The former is a gold property, the latter a low-grade porphyry copper.

British Columbia Timber Lands

In British Columbia the United Copper Company holds an undivided one-half interest in 540,000 acres, situated in the southern part of British Columbia and in the vicinity of the Columbia & Western Railway, a section of the Canadian Pacific system. According to a report made by G. W. Mason, of Cœur d'Alene City, Idaho, these holdings are worth: Land, 539,010 acres, $2,546,375; timber, 636,000,000 ft., $1,411,500; total value, $3,957,875.

Mr. Heinze expresses the greatest confidence in the value of the holdings of the United Copper Company and states that litigation against the company, and later against himself, has made it impossible for the most economic and profitable operation of the subsidiary companies.

Ohio Copper Company

According to a report by F. A. Heinze, president of the United Copper Company, the mill of the Ohio Copper Company, at Lark, Utah, when completed will have a capacity of 3000 tons daily. At present one-half of the mill is finished and in operation. The cost of milling has been 38c. per ton. Figures so far obtained indicate that the cost of mining will be less than 50c. per ton. The freight on ore between mine and mill is 15c. per ton. Ore in sight is over 13,000,000 tons.

The cost of the mill up to March 31 was $1,273,215. It is estimated that $250,000 is required to complete the plant. According to these figures the cost of the plant will be about $1.50 per ton of annual capacity.

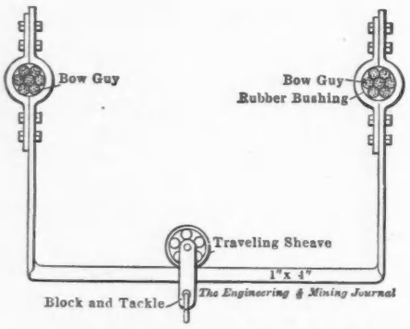
In May, the Goldfield Consolidated Company milled 19,800 tons of ore and, owing to the recent fire, only 70 stamps were dropped. This means that a stamp duty of 9.1 tons was attained. The tonnage put through the mill last month with 70 stamps dropping was greater than was ever crushed with 100 stamps before chilean mills were introduced between stamps and tube mills.

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

Tackle to Serve Bucket Line

A tackle to handle the heavy iron used on dredges to knock out pins in the bucket line is usually suspended from the bow gauntry guy rope. C. E. Himes, a dredgemaster on the Folsom, Cal., division of the Natomas company, has the block and tackle hung from a sheave traveling on a frame between the two bow-gauntry guys. The frame on which the sheave travels is made of one piece of 1x4-in. iron, bent as shown in the sketch and firmly bolted to the guy ropes. A piece of old stacker belt is used as a bushing where the iron is clamped about the guys. By having the block and



TRAVELING TACKLE FOR DREDGE BUCKET LINE

tackle suspended from a traveling sheave, it is much easier to swing the heavy iron to knock out pins from either side of the bucket ladder. The sheave travels across the digging well.

Bull Jig Rougher in a Joplin Zinc Mill

BY L. L. WITTICH*

To abolish the necessity of regrinding much of the zinc ore that would be returned to the rolls after failing to pass through a ⅝-in. revolving screen, the Culpeper Mining Company, north of Carterville, Mo., has installed what is termed a bull-jig rougher, and claims the capacity of the mill is increased 100 tons per day, making its total capacity 500 tons.

This is the first instance of a rougher jig of different construction from the regular rougher being installed in the Joplin district. It is situated high in the building and handles only the coarse ore that passes through a ½-in. revolving screen. The regular rougher cares for the ore passing through the regulation ⅜-in. mesh. The operators claim the extra cost of running the bull jig is too insignificant to be considered.

The bull jig rougher is composed of two large cells, each 36 in. wide and 60 in. long. Four eccentrics, two for each cell, operate the jig beds. Were it not for the bull-jig rougher a large volume of chats, on failing to pass through the ⅜-in. screen would be returned to the rolls for regrinding. Of the concentrates, neither draw-off nor hutch product from either cell, go directly to the bins. A return of this mineral-bearing ore is made to the chat rolls where it is reground. Ore that passes through the ⅜-in. screen then goes to the regulation rougher, from the first cell of which the draw-off goes directly to the bins.

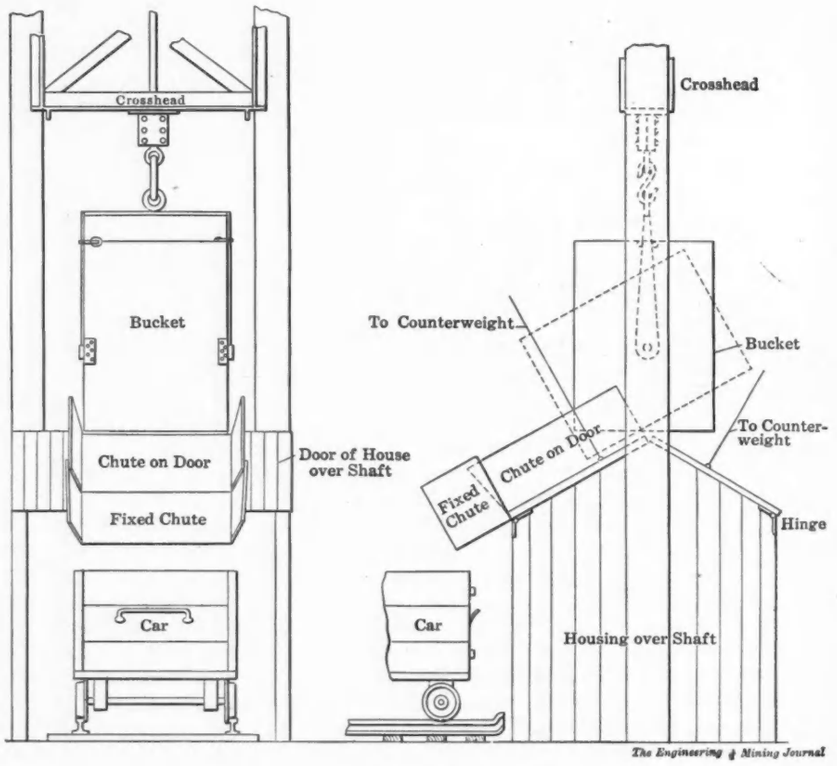
Tailings from both the regulation rougher jig and the cleaner, are drained over revolving screens, the water passing into settling tanks from which the slime feed is drawn for the tables.

*Joplin, Mo.

Bucket and Chute for Shaft Sinking

BY A. P. ROGERS*

In sinking a shaft in South America a few years ago it was necessary to devise an arrangement for dumping the bucket which would be capable of rapid operation in the hands of the native labor. The usual plan of a rope with a hook on the end of it to attach to a ring in the bottom of the bucket for dumping purposes did not appeal to me; it is not a neat arrangement, and a careless topman or engineer might cause some large rock to drop out of the basket down the shaft.



SURFACE DUMPING ARRANGEMENT

The accompanying sketches illustrate my device in more or less detail, and can be readily changed to suit any local conditions. As the distance between the guide rails in each skipway was only 2 ft. 2 in., I had the body of the bucket made in a cylindrical form, 5 ft. high by 2 ft. diameter, and so hung on the bail that the center of gravity was slightly

*Mining engineer, 25 Broad street, New York.

below the bearings when the bucket was empty. A heavy bottom to the bucket brought the center of gravity quite low for this purpose. Two lugs attached to the top of the bucket held it fixed in this position. When it was filled with a load of rock, however, the center of gravity was slightly raised and the moment the lugs were thrown it required little effort by the topman to dump the bucket. Several forms of bail were tried out, but the most satisfactory proved to be the one shown in the sketches, consisting of two side rods hung on a heavy, flat crossbar, through which the cable hook was attached.

The crosshead used was made from channel irons as guide shoes, with diagonal braces. Two lighter channel irons were riveted to these for top and bottom plates. It made a rather heavy crosshead, but for continuous use over a long period of time it proved satisfactory and substantial. The weight was more of an advantage than otherwise, as it made the bucket ride smoothly.

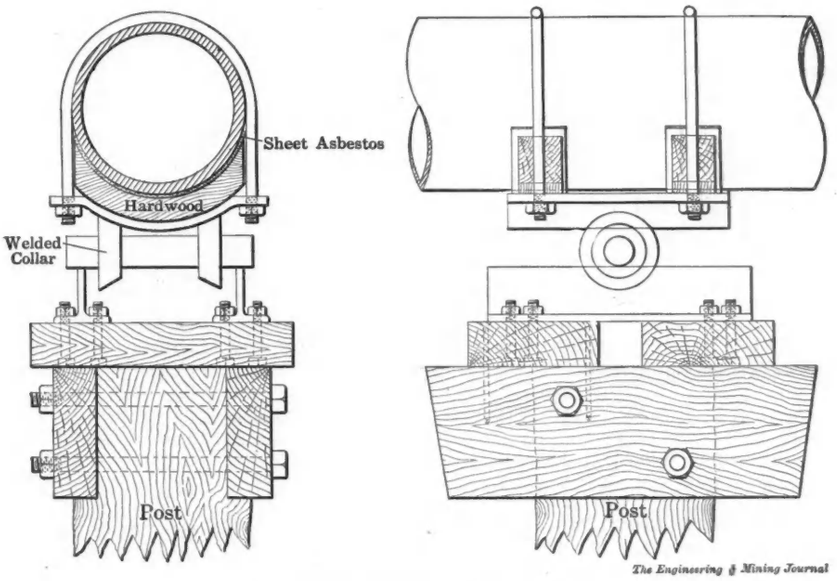
The housing over the top of the shaft was built up 5 ft. high and the trap doors were constructed from 2-in. plank. On top of the door, upon which the bucket was dumped, I bolted a sheet of ⅛-in. iron, with two sides bent up, forming a chute for the rock into the car. This iron made the door heavy, but with a counterweight it was perfectly easy to open and shut. The arrangement was used with perfect satisfaction for two years without accident and the topmen became expert in operating it rapidly.

The stamp duty at the Ready Bullion mill of the Alaska United Gold Mining Company, Douglas Island, Alaska, during the last fiscal year, was 5.37 tons per 24 hours.

Supporting Roller for Outdoor Steam Line

The sketches show a supporting roller for outdoor steam lines that are carried some distance on posts. This particular drawing shows a roller for a 7-in. steam line that is supported for a distance of 1200 ft. and contains five expansion joints. The roll allows for a movement of 6 in., which is taken up by the expansion joints and is ample for the greatest variation of temperatures.

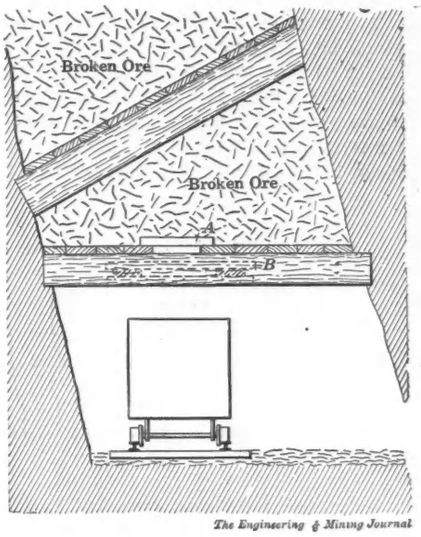
The posts of the steam line are set to grade and notches cut in each post parallel to the line. A plank 18 in. in length is bolted in place in the notches in order to support the two T-irons that form a track for the roller. The roller is 1½ in. in diameter, with two welded collars gaged, according to the size of the pipe in the line. Resting on the rollers is a bent plate held to the pipe by means of two U-bolts. There is a packing between the plate and pipe composed of 1¼ in. of hardwood and a sheet of ⅛-in. asbestos. This allows room above the roller for the steam-pipe covering.



ROLLER SUPPORT FOR STEAM LINE

A Modified "Chinaman"

The accompanying sketch shows a modification of the chute, described in the JOURNAL of Sept. 4, 1909, known as the "chinaman," and recently put into use in the shrinkage stopes of the Copper King mine, at Clifton, Ariz., by L. W. Armstrong, superintendent. It was found that the "loose, sliding" boards covering the opening in the center of the platform would not slide easily, or at all, when covered with ore from the stope, making it extremely onerous to open the chute and to close it when the car was filled. The difficulty was overcome by nailing a cleat of 2-in. stuff to the inside of each of the stulls supporting the platform and fitting in 2x6's from stull to stull on either side of the opening above; these 2x6's support loose boards *B*, as shown in the sketch, which can be easily moved by hand or with a short, sharp-pointed bar. Two of the loose boards *A* on the platform are removed, leaving a permanent opening. It was found expedient to raise the platform about 3 ft. above the top of the car as it enabled the trammer to get at the chute door more easily, and also avoided the inconvenient reduction in the hight of the level at the "chinaman."



THE IMPROVED CHINAMAN

Underground Sorting Grizzly

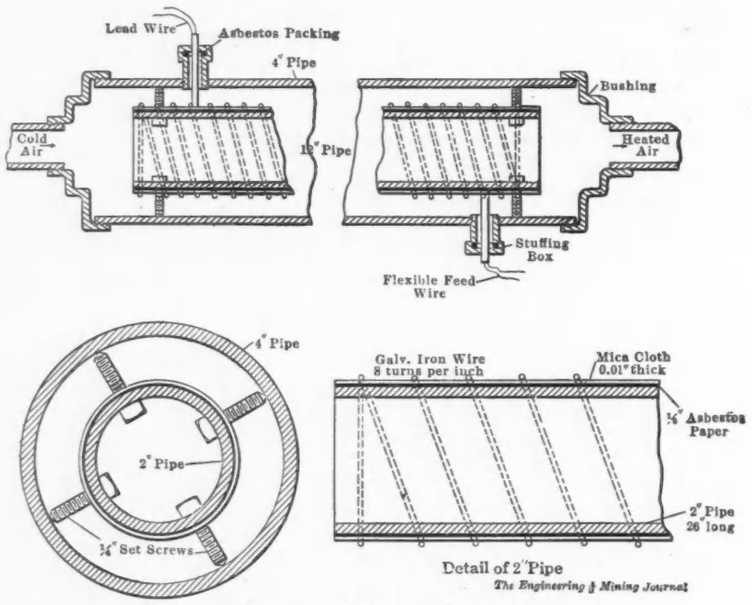
Ore is sorted in stopes to as great an extent as is possible in the Last Chance mine at Wardner, Idaho. In development work or raising, however, it is practically impossible to do any sorting when the ore is broken, so "automatic sorters" are placed at some convenient point in the chute, usually near the level below.

The sorter is merely a grizzly placed across the rock chute, with a small platform beside it. This platform is usually a few boards or a wooden door covering the top of the second compartment of the chute, two compartments being maintained down to the tramming level below. All fines from the heavy galena ore are considered as ore, so the continuation of the chute below the grizzly is the ore compartment. An opening is left beside the grizzly through which large pieces of ore can be dropped into the chute. Waste material is sorted out on the platform and grizzly, and dropped into the second compartment of the chute.

Electric Reheaters

At the Bully Hill copper mines in Shasta county, Cal., a novel type of reheater is used in connection with pumps operated by compressed air. The arrangement is an electrical resistance coil inclosed in a pipe through which the compressed air passes directly before being utilized. The arrangement was worked out by H. A. Sutliffe, electrician for the Bully Hill Copper Mining and Smelting Company, and has proved thoroughly satisfactory.

The reheater consists of two principal parts, i.e., an outer jacket and an inner length of pipe upon which is wound the resistance wire. The air line is bushed to the pipe jacket and through this jacket are tapped, as shown in the drawing, two ½-in. holes provided with insulated stuffing boxes through which the flexible, lead wire is connected to the resistance coil.



ELECTRIC REHEATER USED AT BULLY HILL, CAL.

In the design shown the resistance coil is wound on a section of 2-in. pipe, 26 in. long, the jacket pipe being 4 in. in diameter. The central pipe is first wrapped with ⅛-in. asbestos paper, and this in turn covered with mica cloth 0.01 in. thick. Over this is wrapped a helix of No. 14 galvanized-iron, telephone wire pitched eight turns to the inch. At points 1 in. from either end, the central pipe is tapped for set screws at four equally spaced points about its circumference. These set screws serve to keep the resistance coil from touching the outer pipe jacket. The wire coil is so wound as to not touch the set screws.

A reheater, as described, is designed for a 110-volt 40-amp. current and will use approximately 6 h.p., yet at the Bully Hill mine a saving of at least $6 per month has been effected, it is claimed, by each reheater installed. The reheaters are credited with raising the available air pressure 5 lb. With the electric reheater it is well to have the valve controlling the air engine, pump, etc., for which the air is being heated, connected with a pilot light, so that when the engine is shut off, attention will be called to that fact at once and the reheater will be disconnected. If this is not done there will be danger of burning out the reheaters as they soon become hot enough to destroy themselves if allowed to run after the air is cut off.

Heating Cyanide Solutions

In the Montana-Tonopah mill, Tonopah, Nev., heating the cyanide solutions during agitation is practised. Hendryx agitators are used and at first radiators were put in these. After a couple of months a scale formed over the steam pipes rendering their efficiency extremely low.

The practice finally adopted is to pass steam at about 30 lb. pressure into the solution through a 1-in. pipe terminating below the surface of the pulp. Solutions are now kept at 90 to 95 deg. F. (higher temperatures cause an increased cyanide consumption) and with a small consumption of steam, and no additional cyanide, the extraction has been bettered almost 5 per cent.

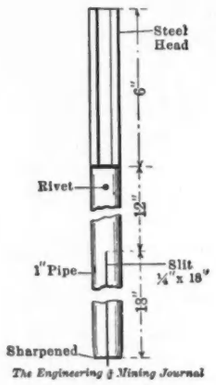
The Automobile in Mining

The automobile is doing much to solve the transportation problem in Mohave county, Arizona. A large auto-truck, put into use by the Dixie Queen mine recently, has been thoroughly tried out in the 25-mile haul between the mine and Chloride and has given fine service. Loads as high as four tons have been successfully hauled to the mine in less than half the time by teams. Six machines bought in Kingman several months ago have been in use constantly, and as many more have been ordered recently. A 60-h.p. automobile will be used for transportation to and from the railroad terminal at Chloride by the Dandy mine.

Sampling Lead Concentrates

The sampling of fine lead concentrates has long been a serious problem among producers. It is desirable to sample in the cars when shipment is made. The chief difficulties have been to reach the bottom of the car and bring up a representative sample.

The sampler in use by several companies in southeast Missouri accomplishes this in a satisfactory manner. It consists of a 1-in. pipe about 3 ft. long. It is split about ¼ in. wide, the split starting at the bottom and running up about 18 in. The bottom is sharpened, and a piece of drill steel is riveted in the upper end.



SAMPLING TOOL

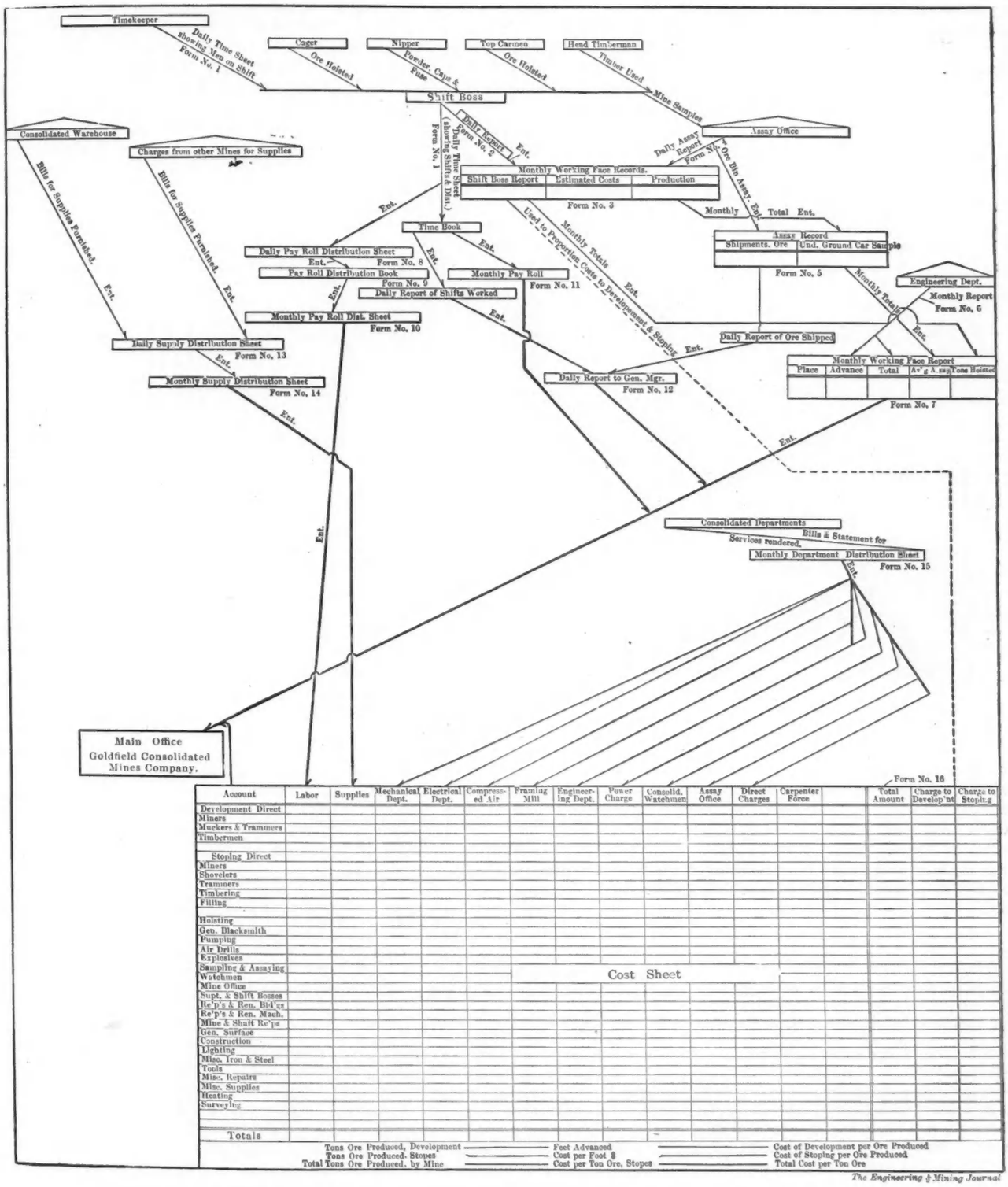
In sampling a car it is first marked off into 2-ft. squares. This gives from 48 to 64 holes to the car. The sampler is driven to the bottom of the car with a 6-lb. hammer, and then pulled out. The spring of the pipe holds the ore, which falls out when the pipe is tapped on the side. In vanner concentrates there is sometimes a suction which will pull out part of the sample. This may be avoided by loosening the pipe in the hole as much as possible and then removing it with a twisting motion. The samples are emptied on a sheet of iron and cut down by quartering in the usual manner. This method of sampling has proved satisfactory, checking within less than 1 per cent. with the smeltery samples which are taken every twentieth shovelful.

Satisfactory experiments with the concentration of fluorspar ore, using the Monell table, have been made at Jamestown, Boulder county, Colorado.

Flow Sheet of Reports

The accompanying diagram explains the new cost system which has been installed in the office of the Goldfield Consolidated Mines Company, under the direction of J. R. Finlay, general manager. The original drawing from which the illustration was made was contributed by Heath Steele.

The arrangement given here is a great improvement upon former methods and may be modified to suit any mine, large or small. A good system of bookkeeping, and a complete record of all of the mine work is indispensable at any mine. The scheme here illustrated is comprehensive, and the reports to the general manager are such that he can tell at a glance just what is being done by any department. In fact, a brief examination by anyone will enable him to readily grasp the basic idea of the system and should be of assistance at any property where a new cost and report system is in contemplation.



FLOW SHEET OF MINE REPORTS AS USED BY THE GOLDFIELD CONSOLIDATED MINES COMPANY

First Year of the Gowganda District, Ontario

Transportation Facilities Inadequate. First Power Plant Installed April 1909. Total Shipments Amount to 320 Tons, Valued at $400,000

BY G. M. COLVOCORESSES*

Gowganda has passed through its first year of development and mining work and in April, 1910, closed its first shipping season. It has not produced any startling results, but from a prospecting field it has become a mining camp and taken second place among the silver-producing districts of Ontario.

In April, 1909, the first power plants were being erected while the pioneer hand-steel work had been begun barely three months previous. No shipments of ore were possible until January, 1910, because in summer the camp was only accessible by 100 miles of canoe and river route. Since January, 13 car loads have been shipped, containing approximately 320 tons of cobalt-silver ore. The exact grade of these shipments is not generally known but I would estimate that in the aggregate they contained close to 800,000 oz. of silver valued at $400,000.

THE FIRST AIR DRILL IN THE GOWGANDA DISTRICT, MAY 10, 1909

LUMBER FOR POWERHOUSE MADE WITH WHIPSAW AND BROAD-AXE

HISTORY

The history of the camp is brief, dating from the summer of 1908 when prospectors following up the Montreal river found silver on the west shore of Gowganda lake, while at nearly the same time silver-bearing veins were found near Le Roy and Miller lakes, which are three miles east of Gowganda lake. Those sections are now included in the Gowganda district, which may be roughly bounded by a rectangle eight miles long, north and south, and six miles wide. There are also several promising localities outside of this district. The pioneer claims were all staked before September 1908, when the assessment work (largely stripping) was done by the original owners who early realized that Gowganda was not a poor man's camp and sought capital to assist them.

My first visit to Gowganda was in November 1908, just at the "freeze up," which, barring the "break up," is the nastiest time of the year. The canoe route was frozen up and the winter road was not yet cut through, so that our party walked the entire distance from the Temiskaming & Northern Ontario Railroad at Charlton to Gowganda (60 miles), and back again two weeks later. The conditions of the trail and the camp at that time were vividly described by H. E. West[1].

DEVELOPMENT WORK IN 1908

Other than surface stripping no development work had been done, and except at Le Roy lake there was not a test pit 10 ft. deep in the whole district. With one exception the silver-bearing veins had been found in the diabase. They were all narrow, 2 to 2½ in. wide, and a few had been traced over 100 ft. in length; most of them were less than 50 ft. In these veins the oreshoots showed for a length of 6 to 25 ft., rich in native silver associated with calcite and cobalt minerals or with black mud; and thin leaf silver impregnating the wall rock for 3 or 4 in. on each side of the vein proper. Outside of the oreshoots the vein filling is mud, calcite and quartz, cobalt bloom and smaltite. There was nothing remarkable about the surface showings in themselves. They were well worth development on option, but for the properties to become profitable mines it was necessary to suppose that the oreshoots would lengthen as they went down; that new oreshoots would be found and that their grade and width would not diminish for at least 80 or 100 ft. in depth. The remarkable things about the district were the large area over which the silver showings had been found in two months' prospecting, the number of veins showing some silver and the high grade of the oreshoots exposed.

HIGH PRICE OF CLAIMS DUE TO COBALT'S SUCCESS

On many of the claims it certainly seemed as if investors would be taking a long chance to buy outright on the high prices that were being asked by the prospectors. Yet such chances were taken, and before the month of February the ownership or controlling interest in most of the properties showing silver had passed from the original owners at figures that varied from $50,000 to $500,000, all or a good part of which to be paid in cash.

I think that it was not so much the ore showings themselves which sold the prop-

*Superintendent, Millerett Silver Mining Company, Ltd., Gowganda, Ontario.

[1]ENG. AND MIN. JOURN., May 1, 1909.

erties as the shadow of Cobalt which hung over this new district, nearly 100 miles away, and which gave to the claims a prospective value that without Cobalt they never would have had. It will be remembered that Cobalt was at first looked at askance by many engineers and investors. The best prospects there were sold at the start for a few thousand dollars and have since made fortunes for their purchasers. In spite of some weak spots Cobalt has proved a wonderful camp and when silver is found in "New Ontario" the cry goes up that another Cobalt has been discovered. Some of the Gowganda prospects were sold to men who had made money in Cobalt, but more to men who had not made money in the early days of Cobalt and who have been kicking themselves ever since for missing that golden opportunity.

Winter Road Completed to Gowganda

Early in January, 1909, the winter road was cut through to Gowganda lake where a mushroom town sprang up with surprising rapidity and the real rush to the camp began.

Work was started on the staked claims while several hundred prospectors and "claim stakers," (there is a big difference) snowshoed over the country for 20 miles in every direction and staked a large portion of it, often without having seen the rock formation which lay under 3 ft. of snow.

By February most of the properties that showed silver had begun underground developments. The new owners showed no lack of faith in their prospects. About 30 camps, to accommodate 20 to 80 men, were built. Hand-steel work was started at all of them while nine power plants, ranging in capacity from 20 to 170 h.p., were brought to the properties before the winter road broke up early in April.

Then operators then laid in provisions and supplies for 8 or 10 months' work and general stores were heavily stocked up at Gowganda. Throughout March 600 sleigh teams worked at high pressure between Charlton and Gowganda and 300 over the western road from the terminus of the Canadian Northern Railway at Sellwood.

Power Plants Installed

By the middle of June most of the power plants were in operation and air or steam drills took, in part, the place of hand steel, while prospecting, stripping, trenching, and sinking were being carried on vigorously throughout the entire district. At this time probably 40 tons of high-grade ore were bagged up in the camp, taken entirely from the silver shoots near the surface. Underground developments, however, have not been satisfactory. The deeper shafts, then down 50 to 60 ft., had lost the veins or lost the oreshoots (which often pitch considerably in the vein) and all through the summer of 1909 Gowganda presented a rather sad appearance. Most of the claims staked on the snow were found to be worthless. Comparatively few new finds had been made on the original claims. Only two of the mines were steadily producing ore in any quantity and most of the underground workings were out of ore altogether. It is not surprising that many of the people who visited the camp at this time went away with the impression that Gowganda possessed merely a scattering of little surface-ore pockets not good enough to be converted into mines.

Fortunately the owners of the properties were not so easily discouraged and in the autumn things changed for the better. Several good surface finds had been made and good ore had been struck at depths varying from 60 to 90 ft. On the first of December there were close to 200 tons of ore bagged, while several of the mines had developed small ore reserves sufficient at least to assure their working profitably throughout the winter.

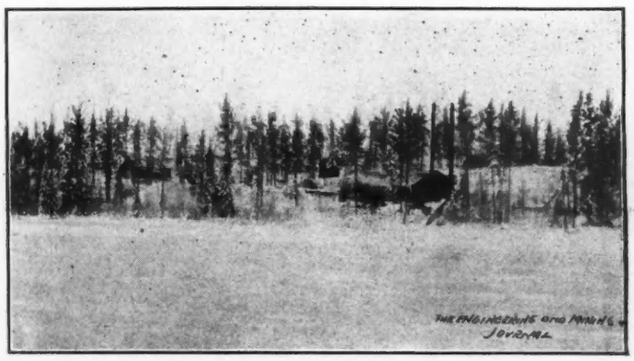
Geology

Several articles have already been published dealing at length with the geology of Gowganda, which in the main is similar to that of Cobalt. The oldest formation is the Keewatin, consisting of basic igneous rocks, both massive and schistose in structure, and always highly metamorphosed. Much of this formation appears to be more or less altered diabase, differing considerably from the later and much fresher looking Pre-Cambrian diabase in which the silver veins are found. Two silver-bearing veins and two veins carrying smaltite and niccolite assaying a few ounces in silver have been found in the Keewatin. This formation covers a large area near Miller lake. Little attention has been paid to it in the neighborhood of the diabase dikes, which would seem to be well worth careful prospecting.

The Laurentian rocks, granites, syenites and gneisses, intrude the Keewatin. No veins of value have been found in the Laurentian nor is it likely that any will be.

Huronian Sediments

The Huronian sediments, conglomerate, quartzite, arkose slate and greywacke, originally covered all the older rocks, but they have been worn away by a long period of erosion so that only scattered patches are now left. At Cobalt this formation has by far the greatest economic importance, but in the Gowganda district only one producing silver vein has been found in the Huronian. This is near Miller lake, and is among the best veins in the camp. Another strong vein, 6 in. wide, containing smaltite and niccolite, occurs in Huronian quartzite and conglomerate, but the assays show only a few ounces in silver to a depth of 40 ft. The absence of good finds in the Huronian rocks has caused them to be locally considered of little importance, but it may well be that more careful prospecting will be richly rewarded.



Gates Mine, Near Miller Lake, December, 1909

Millerett Silver Mine, March, 1910

Pre-Cambrian Diabase

The youngest rocks in the district and so far the most important are the Pre-Cambrian diabase or gabbros, which cut through all the later formations in sills, sheets and dikes. These rocks are, no doubt, of the same age as the diabase at Cobalt and along the Montreal river. At Cobalt there are a few good producing veins in the diabase, but with one or two exceptions they are pockety and irregularly mineralized. This characteristic holds true in the diabase veins of the Montreal river and Gow-

ganda districts. The veins at Gowganda may be divided into three classes: (1) Gash veins; (2) fissure veins; and (3) veins in faults.

Gash Veins

The gash veins are of but little importance. These seem to have been cooling cracks in the diabase, and erosion has only left the roots of the cracks on the present surface. They are narrow, have a length of 50 ft. or less, and usually pinch out at 30 to 50 ft. in depth. Some small silver showings were found in these veins, but development has resulted only in disappointment to their owners and a few hundred pounds of ore.

Fissure Veins

Fissure veins appear to be persistent with little or no evidence of faulting. These veins can be traced from 50 to 500 ft. in length and as far as developed they continue in depth. As a rule, they do not exceed 2 or 3 in. in width though some widen out in places to 8 or 10 in. The main filling is calcite, with mud resulting from decomposition near the surface, and often bands of quartz. With these are associated the cobalt minerals and native silver. A little argentite, ruby silver and silver chloride are to be noted in spots. Chalcopyrite, galena, bismuth and pyrite are often found, but seem to have no influence for or against the silver and cobalt minerals.

The ore occurs in shoots, none of which are long. No great quantity of ore has yet been extracted from any one of these shoots. This type of vein is by far the most predominant in the camp, and the future of Gowganda seems to be largely dependent on the proportion that the pay shoots will bear to the worthless portions of the veins.

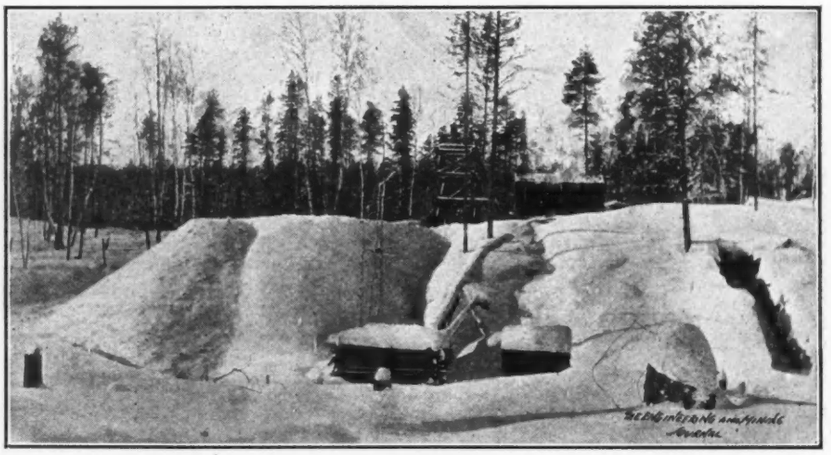
Two Main Systems of Fissure Veins

Although striking in all directions, the best veins have so far been developed along two systems or ranges whose longer axis is north and south. The western range, known as "The Ridge," lies along the west shore of Gowganda lake and has a length of four miles. Over 200 veins have been found on this ridge with silver occurring in about 50 of them. Near the south end of the ridge are the O'Brien, Bartlett and O'Kelly mines, and north of these the Welsh, Reeves-Dobie, Crawford, Silvers Ltd., Mann, Boyd-Gordon, La Brick, Bishop, Trans-Continental and Dufferin, besides several smaller properties which are not mentioned. The Reeves-Dobie has over 20 veins. The Welsh claims are said to have 40. The Boyd-Gordon on the 75-ft. level passed through 14 veins with a north-and-south crosscut 400 ft. long; but the number of veins bears little or no relation to the value of the properties as ore producers.

The eastern system of veins starts south of Miller lake and west of Le Roy lake. It runs northward to the south end of Everett lake, a distance of three miles. Along this range are the Le Roy mines, Canadian-Gowganda, Northern Mining Company (Morrison), Gates mine of M. J. O'Brien, Millerett mine (Blackburn), Bonsall, Le Heup and Everett lake mines. The number of veins is not so great as on the western range nor has there been so much development, yet the outlook would seem equally favorable.

Veins in Fault Zones

The veins in fault zones are a third type of vein of which, until recently, little notice was taken. These are remarkably strong and persistent fault fissures filled with calcite and fragments of the diabase wall rock. The width of these veins is from 2 to 8 ft., and some of them have been traced for over half a mile. The calcite is largely crystalline and stained brown in spots. There are probably 20 such veins in the district. Low silver assays are reported from nearly all of them, and in one, a native silver shoot 15 ft. long and 6 in. wide has been found and sinking is shortly to start on this property. Many of the second type of veins appear to be really offshoots from these big calcite ledges, and several tons of good ore have been extracted from these offshoots quite close to the parent vein. The big fissures may be expected to hold strong to considerable depth, and if pay shoots should be found in depth they may, in connection with their offshoots, play an important part in the future of the camp.



Mann Mines, Ltd., No. 1 Vein, Gowganda

Cobalt and Gowganda Compared

Cobalt was discovered in the summer of 1903 and the production for 1904 was $136,217. Gowganda, discovered in 1908, has produced $400,000 up to March 31, 1910. Cobalt was on the railway line. Gowganda is 55 miles from the railway with a winter road that lasts only four months, and during its first summer was only accessible by a canoe and river route 100 miles long, with 20 portages. Cobalt worked all during its first year with hand steel, whereas Gowganda had nine power plants almost from the start. Though handicapped by remoteness and difficulty of transportation, few camps have been so favored by the confidence of investors and the readiness to spend large sums of money to hurry developments.

Not many persons in the camp would care to predict that Gowganda will in the next year produce ore to the value of $1,500,000, as Cobalt did in its second year, but still it may do so. In camps like Gowganda, one does better not to predict at all. The developed high-grade ore reserves of the camp are small, and it is probable that for three or four years at least they will continue to be so. Like a famous silver mine in Mexico, "as soon as they get any ore in sight, they take it out of sight."

Low-grade Ore Reserves

The developments to date have proved up fair reserves of low-grade ore which cannot be profitably shipped at present, and if these reserves continue to develop, Gowganda must either have a railroad or put in mills next winter. This feature of the camp is one of great importance, for the low-grade reserves have a large prospective value.

For another year at least the shipments will all come from the high-grade oreshoots and the success of the operations will depend on the frequency with which such shoots are encountered.

To extract the rich ore is a comparatively easy matter once it is found. The mining and shipping costs, high as they are, are small compared to the cost of exploration and development necessary to locate the oreshoots.

Future Outlook

The future of Gowganda is still uncertain, but it has done much in its first year. The general conditions are steadily improving. Labor is better and more

plentiful. Supplies are becoming much more reasonable. The winter freight rate for 1909 averaged close to $4 per 100 lb. from the railroad. The summer rate was $7.50. In 1910 the winter rate averaged $1.75 and now that a wagon road has been built from Elk lake, it is probable that the summer rate will be about $3 per 100 lb. Five new power plants have been added to the camp this year and it is likely that all the older plants will operate steadily during the year. Not including purchase price of properties, something like $2,000,000 have already been spent in equipping and developing the Gowganda district. In some cases the output of the mines has already justified this expenditure. There can now be no doubt that silver exists in considerable quantities at Gowganda, and the owners of the mines mean to keep on finding it. The record of the camp to date is a favorable augury for a profitable and steadily increasing production.

Assaying Sulphide Ores

By F. G. Hawley *

Assaying oxidized ores for gold and silver by the crucible method is usually much simpler than assaying sulphide ores. One of the principal reasons for this is that sulphides are strong reducing agents and it is difficult to determine beforehand just what the reducing power will be. If an excess of litharge is used in the flux, as is customary, an abnormally large button may be formed. An attempt to correct this by the use of niter, and not correctly estimating the amount necessary, may result in an undersized button or possibly none at all. One method to obviate this trouble is to roast and treat as an oxidized ore. This not only lengthens the process, but may also cause some losses. Another way is to run a preliminary assay to determine the exact amount of niter necessary. This, although it is undoubtedly reliable, is a long process. If many determinations are to be made and the results wanted quickly, a shorter method is desirable.

Estimation of Sulphides

I have worked out a method that, with a little practice, combines rapidity and accuracy. It has been in use for several years at Cananea and has proved satisfactory. The new feature involved is the manner of determining the percentage of sulphide and a formula governing the use of niter. When the ore is received in lumps of fair size, the sulphide contents can usually be determined with sufficient accuracy by simple inspection. But if the ore is received as pulp, a small amount of it is vanned and the sulphide contents noted.

The method of vanning is as follows: A number of color plates, more often called spot plates, are placed in a row end to end and a small amount of each sample placed in the corresponding depression, using only the outside row of holes. The samples are now vanned, four at a time, in a basin of water and the approximate per cent. and kind of sulphide noted.

Reducing Power of Various Sulphides

Pyrite is the commonest sulphide and has the highest reducing power, so it is taken as the standard and made the basis of calculation. The reducing power of some other common sulphides as compared with pyrite is as follows: Chalcopyrite, ⅔ of pyrite; blende, ⅔; pyrrhotite, ⅔; arsenopyrite, ⅔; stibnite, ½; galena, ⅓; and chalcocite, ⅓ of pyrite. From this we see that 45 per cent. galena or 30 per cent. stibnite has about the same reducing power as 15 per cent. of pyrite.

When using one-half assay ton of ore with an excess of litharge and a fair amount of soda and borax, it is found that 15 per cent. of pyrite will reduce a lead button of about 22 grams, which is about the size required. If the ore contains more than 15 per cent. pyrite or its equivalent in other sulphides, enough niter is added to oxidize the excess. For every 5 per cent. of pyrite above 15 per cent., 2.1 grams of niter are needed. For an ore containing 25 per cent. pyrite, I would add 4.2 grams of niter.

With an ore containing 10 per cent. pyrite and 30 per cent. zinc blende, the blende is equivalent to 20 per cent. pyrite, which, added to the 10 per cent. pyrite present, gives the equivalent of 30 per cent., and using the above rule, 6.3 grams of niter are required.

Lack of Sulphides

On the other hand, if there is not enough sulphide present to reduce the proper-sized button, flour or some other reducing agent would have to be added to supply the deficiency. Suppose, for example, the ore contained 10 per cent. pyrite, or 15 per cent. blende, or 30 per cent. galena, each of which would give a button of about two-thirds of the size required, we would have to add one-third of the regular amount of flour, the regular amount being about 1¼ grams for a 22-gram button.

A convenient way to add the flour is to have two standard fluxes made up in bulk, one containing enough flour to reduce the proper-sized button, and the other containing no reducing agent. A brass scoop holding about 84 grams, which is the usual amount of flux for a charge, simplifies weighing; in order to take one-third of the amount of flour, we take one-third of the scoopful of reducing flux and finish filling with the nonreducing. A small brass scoop is also made to measure the niter. It holds 4.2 grams of niter, which is the right amount to oxidize 10 per cent pyrite. If 20 per cent. pyrite or an equivalent amount of other sulphide is present, use one-half measure of niter. If 25 per cent. is present, one scoopful is needed.

Standard Fluxes

The standard fluxes are made as follows:

Reducing flux: Litharge, 15 kg.; sodium carbonate, 4 kg.; borax, 2 kg.; flour, 0.44 kg. A measure of this flux weighs about 84 grams, which makes a charge of the following composition: Litharge, 60 grams; sodium carbonate, 16; borax, 8; flour, 1.75.

For the nonreducing flux the following is used: Litharge, 15 kg.; sodium carbonate, 3.5; borax, 2.5; silica, 0.5. A measure full of this flux also weighs about 84 grams and gives a charge of approximately the following: Litharge, 60 grams; sodium carbonate, 14; borax, 10; silica, 2.

It will be seen that these fluxes are similar in composition except for the flour. The nonreducing flux is made slightly more acid than the reducing, because the sulphide ores are usually more basic than the oxidized ores on which the reducing flux is used.

The high litharge is especially desirable in eliminating the copper from the lead button and forcing it into the slag. No trouble is experienced from matte, the excess litharge decomposing it.

It is not claimed that these fluxes are of universal application, but they will give good results on a greater variety of ores than any other standard flux I have ever used.

*Chief chemist, Cananea Consolidated Copper Company, Cananea, Sonora, Mexico.

Lanyon-Starr Smelting Company

The 1909 report of the Lanyon-Starr Smelting Company, operating zinc properties in Joplin, Mo., and Oklahoma, shows net earnings of slightly over $44,000, without allowing for depreciation. After charging off expenditures made during the last three years, the profit and loss surplus shows a balance of $17,000. Total construction account for plant and operatives' houses amounts to $272,000. The company operated four blocks of the smeltery during 1909, and the fifth will be started within a few weeks. A third kiln will be constructed this summer, so that the complete plant of six blocks should be in operation in the fall. This new construction will cost about $20,000. The company has a capitalization of $500,000 common stock and $250,000 6 per cent. cumulative preferred stock. There are now 15 per cent. back dividends due on the preferred, but it is expected that by July 1, payments on this issue will be resumed.

East Rand Proprietary Mines, Ltd.

SPECIAL CORRESPONDENCE

This corporation claiming to be the largest gold producer in the world, is capitalized at £25,000,000. The property consists of 3417 reef-bearing claims: A claim consists of 1.47 acres so the area is about 6023 acres. During the year ending Dec. 31, 1909, 1,830,280 tons of ore, assaying 7.63 dwt., were crushed, from which were received 635,908 oz. fine gold or 6.95 dwt. per ton crushed. Owing to the ore being more refractory than is usual on the Rand extraction results were not as high as in many of the mines. The average tailings assayed between 0.6 and 0.7 dwt. The total value of the yield was £2,671,750 or 29s. 2.3d. ($7.10) per ton; cost, £1,412,693, or 15s. 5.2d. ($3.75) per ton; profit, £1,259,057, or 13s. 9.1d. ($3.34) per ton. The ore reserves are estimated at 11,371,761 tons of an average value of 5.7 dwt. Of these 8,778,118 tons have a milling value of 6.7 dwt. The value of the ore reserve is estimated at £12,500,000. The company employed 14,346 colored laborers and 2176 whites.

SATISFACTORY DEVELOPMENT AT ANGELO DEEP

It is stated that recent development in the Anglo Deep mine has resulted most favorably and that owing to lower working costs 71 per cent. of the ore exposed at a depth of about 4000 ft. is payable against only 27 per cent. when the mine was first opened. It is expected that at the end of 1910 nearly five years' ore supply for the mills will be developed.

TO CRUSH 200,000 TONS PER MONTH

Arrangements have been made to increase crushing capacity to 200,000 tons per month. A new compressor plant to drive 350 drills will be completed in June, 1910. Development and equipment expenditure at the end of 1910 will leave a liability of over £1,000,000 to be paid off. Meanwhile dividends are kept down to 40 per cent. per annum which yields a bare 8 per cent. on the present market price of shares, viz., £5. When liabilities have been paid off it is evident that by milling 200,000 tons per month with a profit, even reduced from the present rate of 13s. ($3.16) per ton to 10s. ($2.43) per ton, £1,200,000 profit would be gained. And as lower working costs are expected and development is said to be showing most favorable results a large increase in dividend rate should be possible. The life of the mine has been extended by acquiring claims from the Government and other deep claims. Up to the end of 1908 6,000,000 tons of ore had been milled at an average yield of 38s. ($9.24) per ton.

SCHEME OF OPERATION TO BE BETTERED

The large sum being sunk in development may appear excessive as the interest on money thus spent is an item not generally included in working costs. Work is being pushed to connect the inclined shafts of the outcrop mines with the vertical ones of the deeps so that a reorganization of the scheme of handling ore, water and labor may be taken in hand, and mechanical haulage further introduced into the underground mining scheme. All work as far as possible will be confined to day shifts as thereby a noticeable economy is gained from bettering the health and efficiency of labor. Already 80 per cent. of work done is done on the day shift.

OPINIONS DIFFER AS TO ECONOMY

The chairman remarks "I see no reason why your company should not always have the minimum working costs which it is possible from time to time to obtain and as I have so frequently pointed out minimum working costs mean maximum possible profit per ton, maximum possible life and consequently maximum profit per ton." This gospel is, however, apparently being challenged and the remarks of the chairman of the Rand Mines and of Mr. Marriott, consulting engineer to Ecksteins, published in the same paper form a somewhat amusing and instructive commentary upon this doctrine.

Huelva Production

The shipments of ores from Huelva, (Spain), in 1908 are given in the following table in metric tons:

Shipper.	Cupreous Pyrites.	Iron Pyrites.	Iron Ore.	Copper Precipitate.	Copper Ingots.
Rio Tinto	597,856	668,638	200	12,415	14,679
Tharsis Sulphur and Copper	228,057	187,068	102	3,341	.....
Société Française des Pyrites de Huelva	.....	239,400	.....	.....	.....
Peña	807	135,827	.....	1,721	.....
San Predo	18,978	1,977	.....	4	.....
San Miguel	7,054	21,660	.....	711	.....
United Alkali	103,225	41,203	.....	1,258	.....
Esperanza	86,991	9,583	.....	29	.....
Companario	.....	13,079	.....	.....	.....
Huelva Copper	48,581	.....	.....	67	.....
Compañia de Minerales de Huelva	25,719	.....	5	32	.....
La Hispalense	5,486	7,088	.....	47	.....
Bede	.....	.....	.....	875	.....
Ardila Iron Ore	.....	.....	33,437	.....	.....
Various	87	4,847	.....	31	.....
Totals	1,122,841	1,330,370	33,744	20,531	14,679

The destination of most of the ore was as follows:

Country.	Cupreous Pyrites.	Iron Pyrites.
Belgium	35,854	48,893
France	15,642	322,037
Germany	123,968	212,922
Holland	193,764	178,856
Italy	30,396	108,106
Russia	.....	37,622
Spain	.....	36,677
United Kingdom	473,063	81,993
United States	239,996	268,626

The Hedley Gold Mining Company

The Hedley Gold Mining Company exercised its option on the Nickel Plate mine at Hedley, B. C., Aug. 12, 1909. From that date until Dec. 31, the company reports 17,119 tons crushed with an average assay of about $12.45 per ton. The recovery was $161,394 (about $9.45 per ton) and expenses were $94,543 (about $5.50 per ton), leaving a profit of $66,851 from operations. The company closed the year with a balance of $79,041 after setting aside $35,520 for an initial dividend paid Jan. 4, 1910.

The ore reserves at the time the option was exercised were estimated at about 150,000 tons with an average gold content of $12 per ton. An extensive development campaign is planned for the spring, and also such addition to the water supply as will render the mine independent of weather conditions.

Treating Arsenide Ores

F. P. Dewey, of Washington, D. C., describes in U. S. Pats. 954,263 and 954,264, April 5, 1910, a process for treating metallic arsenide ores, especially adapted for those found in the Temiskaming district of Canada, recovering the arsenic in the form of a soluble sodium arsenate. The object of Mr. Dewey's invention is to convert the arsenic into arsenic acid, and recover this acid in the form of a soluble arsenate.

The process is as follows: The metallic arsenide, after being crushed, is roasted or otherwise oxidized at a low temperature for the formation of metallic arsenates. A temperature not much above 600 deg. C. is particularly important, in order to obtain a maximum amount of arsenic acid. The arsenates are next decomposed by caustic soda with the formation of sodium arsenate and various hydrated oxides of the metals originally combined with the arsenic in the ore. The arsenate solution may then be separated from the insoluble residue. The patents have been assigned to the Dewey Ore Reduction Company.

Mining Costs vs. Profits

In his address at the last meeting of stockholders of the Rand Mines, Ltd., chairman R. W. Schumacher said: "Managers of various mines have in the past during times of stress often been forced to mine the ore that was most accessible; low-grade ore in the hanging-wall or foot-wall was eagerly broken in order to keep the stamps running; sometimes also an unnecessary amount of waste was mined. The results in these instances were certainly lower working costs, and lower working costs for a long time remained the popular cry.

"But with low costs in many cases were combined lower profits and bad mining. Low working costs are undoubtedly desirable as long as they are perfectly legitimate, but they are entirely secondary and subservient to the desirability of making the maximum amount of profit per claim treated. Two or three managers connected with our mines have boldly brushed aside the idol of low working costs and have achieved excellent results thereby.

"H. M. Thomas last year was acting manager of the City and Suburban Gold Mining Company for several months, and by organizing his underground work carefully, by narrowing his stopes and deliberately raising his working costs, increased the profits of the mine to an appreciable extent. W. T. Anderson for the last six months or so has been at the Village Deep, and he goes further than stoping as little waste rock as possible. He is convinced that it will pay to leave in the hanging-wall some of the low-grade ore which had hitherto been taken. The result, it is confidently expected, will be higher profits and bigger dividends, and who then will care whether the working costs are raised or not?"

Natural Gas in Kansas and Oklahoma

The Iola, Cherryvale and Neodesha fields are still producing gas, although in limited quantities. In each of these fields gas is now being sucked by pumping. Neodesha appears to be in better condition for gas supply than Cherryvale. At Iola the local production is insufficient for the requirements and gas is piped in from Neosho and Wilson counties.

In Montgomery county, Kansas, the pumps of the Kansas Natural Gas Company are having a serious effect upon the pools in the northern part of the county. The smelting works at Deering and Caney are obtaining considerable gas from the Vanderpod pool, just over the line in Oklahoma.

Reports from Bartlesville, Okla., indicate that the smelters at that place still have an abundant supply of gas, their draft up to date having reduced the original rock pressure but little. Outside of the consumption by the zinc smelters there is but little industrial use for gas as yet in the Bartlesville district.

Amalgamated Copper Company

The operations of the Amalgamated Copper Company were given in detail in the JOURNAL, March 26, and the Anaconda report was published May 28. The annual report of the Amalgamated company for the year ended April 30, 1910, gives the net income for the year as $5,963,968. This compares with $3,633,980 for the year ended April 30, 1909 and $6,680,557 in 1908, the record being $14,154,400 in 1907. The income account compares as follows:

	1910.	1909.
Net income	$5,963,968	$3,663,980
Dividends	3,077,758	3,077,758
Surplus	2,886,210	586,222
Previous surplus	12,595,045	12,008,823

The company's balance sheet as of April 30, 1910, compares with 1909 as follows:

Assets:	1910.	1909.
Invested in securities	$159,881,245	$156,481,847
Loan to Washoe Copper Co	7,200,000	7,200,000
Cash and cash assets	3,079,914	3,593,102
Total	170,161,159	167,274,949
Liabilities:		
Capital stock outstanding	153,887,900	153,887,900
Accounts payable	22,565	22,565
Dividends payable, May	769,439	769,439
Surplus and reserve	15,481,255	12,595,045
Total	170,161,159	167,274,949

ANACONDA AND PARROT COMPANIES

Details of the mine operation of the Anaconda and Parrot companies have already been published in the JOURNAL. The reduction works at Anaconda treated for all the companies during 1909, 3,517,386 dry tons of ore, of which 1,282,681 tons were from the company's own mine. The Anaconda production was 75,860,194 lb. of copper, 2,363,184 oz. of silver, and 7466 oz. of gold. To this should be added 475,239 lb. of copper produced from the precipitation plant.

The Parrot property has been closed since Dec. 4. The total production last year was 122,349 dry tons, yielding 5,407,255 lb. of copper, 308,757 oz. of silver, and 723 oz. of gold.

BOSTON & MONTANA

The Boston & Montana Company did 51,818 ft. of development work during 1909, and the mines produced 1,374,504 dry tons of ore. The Great Falls reduction works treated 1,092,168 tons of ore, from which were produced 79,037,783 lb. of copper, 1,457,256 oz. of silver, and 9071 oz. of gold.

The Boston & Montana mines furnished more ore than the reduction works could handle, and the excess tonnage was shipped to the Washoe plant; the production from this plant was 22,913,567 lb. of copper, 424,790 oz. of silver and 2698 oz. of gold, making a total production for the Boston & Montana company, 101,951,350 lb. of copper, 1,882,046 oz. of silver, and 11,770 oz. of gold.

The new stack has effected some saving, and further economies which will be embodied in a new concentrator will work for still lower costs.

WASHOE COPPER COMPANY

The Washoe mines were developed to the extent of 6398 ft. last year, and the company produced in ores and concentrates 205,377 tons, which were treated at the Washoe reduction plant. The yield was 8,224,179 lb. of copper, 920,814 oz. of silver, and 2472 oz. of gold.

TRENTON

The Trenton Mining and Development Company produced in ores and precipitates, 157,167 dry tons of ore yielding 7,168,318 lb. of copper, 623,728 oz. of silver, and 577 oz. of gold.

BUTTE & BOSTON

The Butte & Boston development works opened up large amounts of ore, all of which occur in regular vein formation. The Berkley shaft is three compartments and is down 800 ft. The developments at the East Gray Rock exposed large bodies of pay ore. West Gray Rock shaft is 1100 ft. deep, two compartments to the 700 level and three compartments from the 700 to the 1100 level. Only fair results were obtained from development work, mainly in the upper levels of this shaft.

Ore and precipitates amounting to 372,965 tons were produced, yielding 20,955,910 lb. of copper, 1,158,672 oz. of silver, and 7377 oz. of gold.

Lake Copper Company

The third annual report of the Lake Copper Company, Houghton, Mich., for 11 months ending April 30, 1910, states that the mining was confined chiefly to the development of the Lake lode. This work amounted to 4377 ft. of drifting and crosscutting, at a cost of $9.57 per ft., and 1638 ft. of underground diamond-drill work.

During this period 10,125 tons of rock passed through a stamp mill, yielding 170,801 lb. of fine copper, or 21.064 lb. per ton of rock. In the course of sinking the main shaft a new lode was encountered which is called the "East" lode. A new steel shaft house, rock bins, hoisting plant with a capacity of 2000 tons per day, together with other equipment, are now under construction. The total expenditures during the year were $120,507, leaving $184,165 as the balance in banks and trust companies.

The Kennicott Bonanza Copper Mine, Alaska

Copper River Railroad Building to This Mine; Ore Contains Much Chalcocite; Vein Cuts off at Greenstone; Talus Slope of Copper Ore

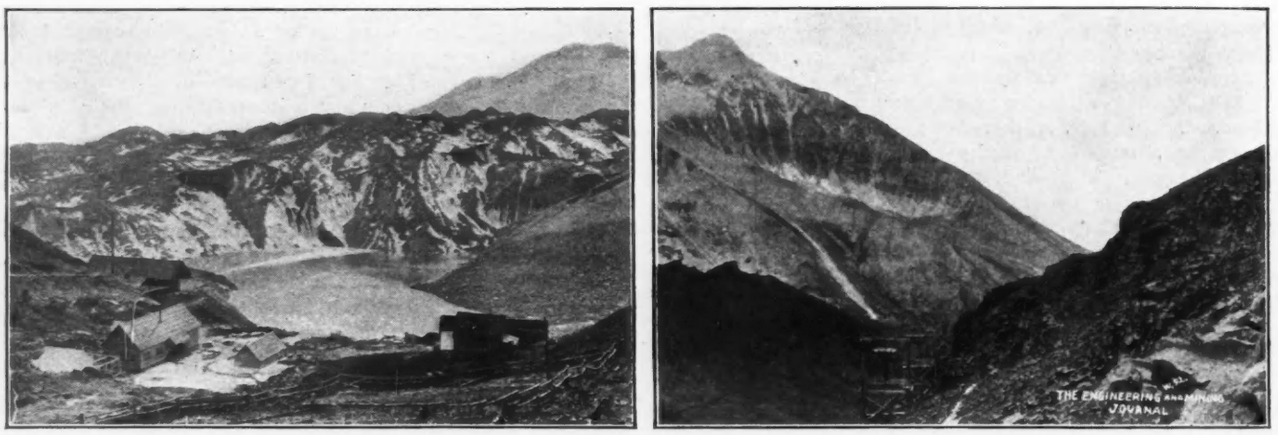
BY L. W. STORM*

The Kennicott Bonanza mine is known simply as the Bonanza among those familiar with copper mining in Alaska. It has had a picturesque history from the time of its discovery in 1900, through a period of complicated law suits and changes of ownership until the present time. It is now owned by the Kennicott Mines Company, one of the Guggenheim organizations.

Upon the richness of this mine have been based most of the enthusiastic predictions as to a future preëminence of Alaska in copper production. Its actual value has been variously estimated by mining engineers at from ten to twenty million dollars, and is the principal reason for undertaking the construction of a railway nearly 200 miles in length through a new and difficult country from the seaport of Cordova on Prince William sound, up the Copper and Chitina rivers to the mine.

The Bonanza is situated in the Alaskan interior in latitude 61 deg. 30 min. north, about 60 miles west of the Canadian boundary and 100 miles northwest of Mount St. Elias. It lies in the eastern part of the Chitina copper region, an area covered principally by the rugged ranges of the Wrangel mountains and drained by the northern tributaries of the Chitina river, whose waters flow into the Copper, and thence into the Gulf of Alaska. The Copper river is a poor stream for navigation, with rapids impassable for boats near its mouth. Moreover, its cañon does not afford an easy route for trail building into the interior, so the route has been by way of Valdez, over the coast range of mountains and up the Chitina river. The distance is about 180 miles over a trail that is none too good in places. All supplies come into the region over this trail, mostly in the winter on sleds drawn by horses. The minimum cost of such transportation from Valdez to the mine is 12c. per pound.

Bonanza mountain, upon whose western slope the orebody occurs, stands east of the Kennicott glacier, rising to a hight of about 5000 ft. above the glacier and 7000 ft. above sea level. The mine is about 1000 ft. below the mountain top, the faulted zone which it occupies standing nearly vertical and striking at a slight angle across the backbone of a spur called Native ridge, which runs down in a southwesterly direction from the main north-and-south comb of the mountain.



LOWER CAMP AND TRAMWAY AT KENNICOTT BONANZA MINE

VEIN DOES NOT EXTEND TO DEPTH

Two formations only of those occurring in the Chitina region are essential in this connection. They are: (1) The Nicolai greenstone, consisting of a number of flows of basaltic lava of Triassic age or older, amygdaloidal in places, considerably altered, close grained, hard and varying in color from brown to light green; (2) The Chitistone limestone (Triassic), overlying the greenstone with bedding planes parallel to the flow planes of the lava. Its true color is bluish, but on the surface this weathers to gray.

Later formations come above the lime and there have been intrusions and dikes formed of diabase, andesite and porphyry. Some of these show about two miles south of the mine beyond the line of a great fault which has displaced the beds, but near the mine there are only the two formations. The top of the mountain is of lime, the base is of greenstone. The contact of the two, which is also parallel to the bedding and flow planes, strikes northwest and southeast and dips about 25 deg. northeast. Its outcrop appears plainly on the mountain side, crossing Native ridge at a point about 100 ft. southwest of the lowest point of the outcrop of the orebody, leaving this entirely in the lime. In fact, the main orebody appears to extend downward no further than the top of a 50-ft. bed of shaley lime, which forms the base of the limestone series.

Practically no ore can be seen in this lower bed, and in the greenstone, still lower, traces even of the faulted zone which forms the vein are hard to find, the displacements being small. A few particles of glance and bornite and oxidized ores appear, as they do in many other places elsewhere in the greenstone; at several places small flakes and slugs of native copper were found which suggested the name of Native ridge, but in the greenstone near the Bonanza present developments show no ore of any consequence.

OUTCROP NEARLY PURE CHALCOCITE

The ore of the main body is chalcocite with considerable azurite and a little malachite. It occurs in more or less irregular masses in the faulted zone, usually roughly parallel to the main, almost vertical fault planes; though it follows, to some extent, minor fault planes as

*Mining engineer, Valdez, Alaska.

well which intersect the vein at various angles. It also follows the bedding planes of the lime, forms stockworks in the crushed limestone and ramifying chamber-like deposits such as are usual in lime. The ore often has the blocky structure of the lime, of which it is evidently a replacement. The massive chalcocite carries from 60 to 70 per cent. copper, three or four dollars to the ton in silver and a little gold.

A striking feature of this orebody is that the great masses of chalcocite which compose it appear directly on the outcrop, covered, if at all, with a mere film of azurite; and these rich masses standing in pinnacles on the comb of the ridge, or showing as blotches on its steep western face, constitute one of the most remarkable surface showings of ore to be seen anywhere in the world. The effect of this sight upon the imagination, enhanced by the majestic setting of castellated limestone cliffs above and the Kenicott glacier winding thousands of feet below, may account for some of the extravagant tales told of the richness of this mine.

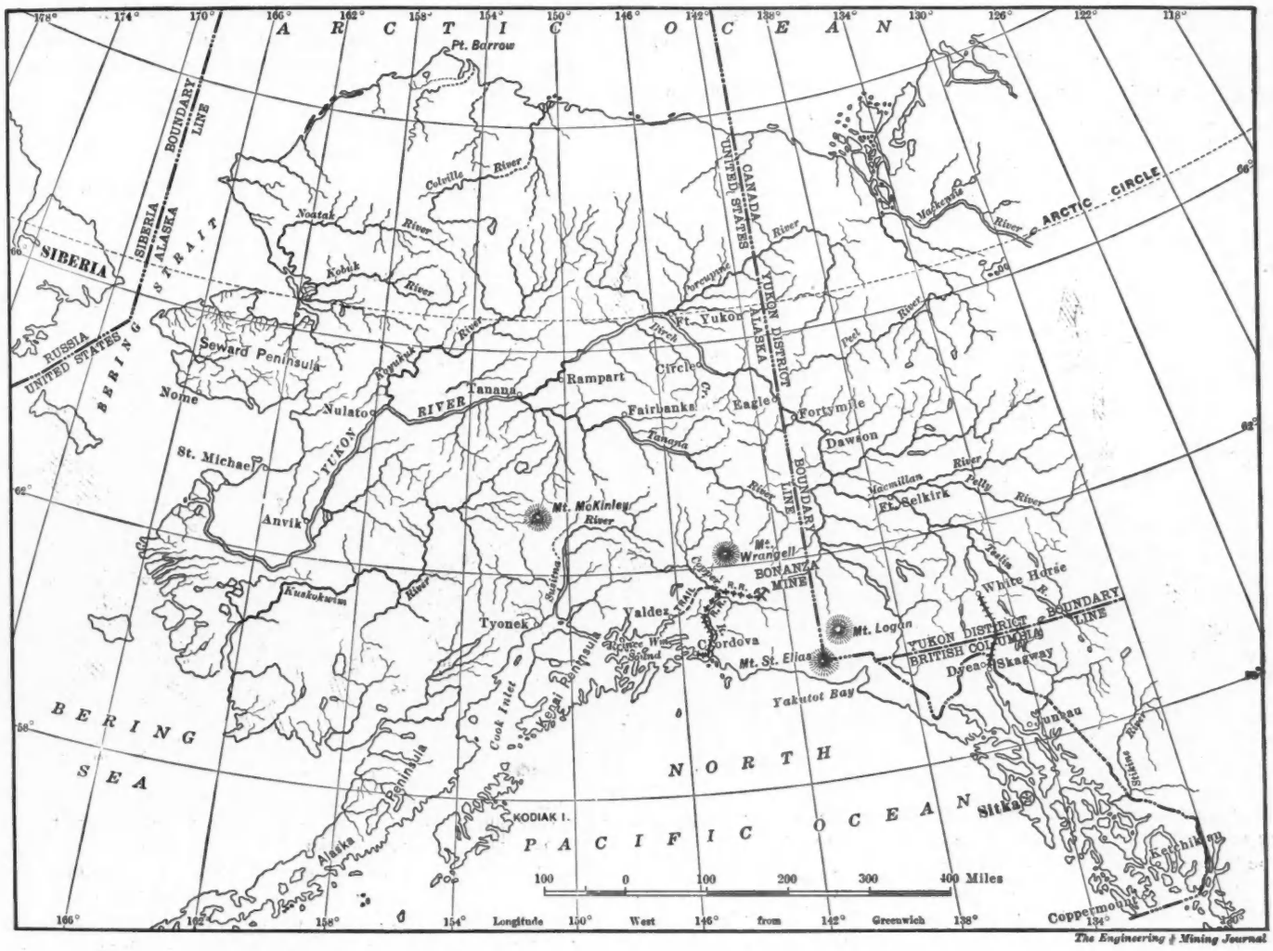
This outcrop is about 25 ft. wide and something over 400 ft. long. The southern half of it, beginning just above the outcrop of impure lime, shows two roughly parallel bands of chalcocite, 4 to 10 ft. wide, running in the direction of the vein and separated by about 10 ft. of lime. These bands show breaks and irregularities in places, and on the north end, give place to thinner stringers or interlacing seams of glance and azurite which thin out as they follow the vein northward and pass finally into barren limestone. Between the masses of rich ore and for a distance of from 5 to 10 ft. on either side, the lime often shows seams and veinlets of azurite. Underground the orebodies show more complexity, with the tendency to follow minor faults and to spread out along bedding planes.

A Talus Slope of Rich Ore

The surface shows another unusual feature in the richness of the talus slope, or slide, as it is called, composed of float ore and limestone that have weathered off from the comb and slid down on the east slope of the ridge. Its width is the length of the outcrop of high-grade ore (about 300 ft.); its length down the slope from the outcrop is 500 ft. or more; its depth varies from 3 to 20 ft. Test pits sunk here and there over the surface gave an average of 4 ft. and most of them had not penetrated through the slide, which is frozen hard even in summer, except for a foot or so on the surface. The average copper contents determined by sampling the material taken from these pits was 13 per cent.

A quantity of ore, probably as great or greater than that of the slide, has gone down over the steep cliff to the west of the outcrop, but it lies buried in a semi-glacier of snow, ice and rock débris, which has slid down from a sort of cirque above, and can be only partially recovered if at all. A bulkhead of logs to prevent further loss of ore on this slope has been built below one of the richest pinnacles.

The amount of underground development is small. It has been deemed expedient by the management to put off extensive development until the railway is completed, when the present high working costs due to expensive transportation will be obviated. The outcrop and the slide provide a good supply of ore to commence shipping as soon as facilities are provided. Such workings as exist are shown in the accompanying diagrams. They consist of a short tunnel through the vein near the south end



MAP OF ALASKA SHOWING BONANZA MINE AND COPPER RIVER RAILROAD

of the outcrop from the west face of the ridge; and a small system of workings entering from the east slope further north and comprising an upper tunnel extending through the ridge, a longer adit tunnel directly underneath, an 80-ft. winze connecting the two and an intermediate level running northerly and southerly from the winze. This winze and the intermediates follow the vein: the upper and lower tunnels cut through it. The lowest tunnel is in the limestone, well above the greenstone. The ore it exposes is exactly like that on the outcrop, and it cuts through seams of ice ½ to 3 in. thick, which evidently extend down from the surface.

Genesis of Ore Uncertain

It is difficult to explain the genesis of such an unusual copper deposit as this, consisting uniformly from top to bottom of copper glance with a slight admixture of azurite. There can be little chance for error in assuming the greenstone to be the original source of the mineral, and the azurite to be secondary. The difficulty lies in deciding as to the primary or secondary nature of the glance.

The following facts favor the primary view: (1) No residues of leaner sulphide ores exist to represent a previous, more primary condition of the copper. This applies to all neighboring deposits in the limestone as well as to the Bonanza; regardless of great difference in size and shape, none of them show any sulphides leaner than glance. (2) The ground is steep, and the erosive action of snow and ice is so rapid that the ore is broken and carried away from the outcrop before it can be altered and its leachings carried into the ground. Moreover the frozen condition of the ground would prevent free descent of water into the vein. This is against secondary enrichment.

The following considerations favor the secondary view: Copper glance appears to be exceedingly stable under the conditions prevailing at the Bonanza. Only the merest film of azurite is formed on the surface as an alteration product, and pieces of glance are found in an unaltered condition buried under slide where they must have lain for ages. Water in the form of ice does penetrate to great depths in the limestone, and it may be that through its agency these deposits have reached a limiting character as chalcocite upon which the carbonated water can have no effect further than to alter it slowly to azurite.

The current theories on ore genesis rest upon data obtained mostly under conditions so different from those of this northern region that they are hard to apply here.

Ore Reserves

It is manifestly impossible, under the circumstances, to estimate closely the available ore in this deposit, but in order to give some idea as to the general class to which the mine belongs, it may be worth while to present here some calculations of tonnage based upon reasonable assumptions. I will assume: (1) That the main high-grade orebody comprises a triangular block limited by the outcrop above, by the top of the impure lime below, and by a vertical dropped from the end of the outcrop on the north. The thickness may be taken at 20 ft., of which one-half is ore. This is about equivalent to a rectangular block 350x150 x10 ft., or 525,000 cu.ft., which at 6½ cu. ft. to the ton, gives about 80,000 tons of ore, carrying, say, 50 per cent. copper. (2) The slide consists of a rectangular block, 300x500x4 ft., or 600,000 cu.ft., which at 12 cu.ft. to the ton gives 50,000 tons of ore, carrying, say, 12 per cent. copper.

The available ore running 3 to 20 per cent. copper, between and around the larger rich masses, probably equals or exceeds the high-grade ore in tonnage, though not in value. These figures leave out of consideration the possible underground extension of the orebody to the northwest, or down into the basal limestone bed or lower, and the development of chamber deposits leading away from the main zone along bedding planes and cross fractures in the limestone.

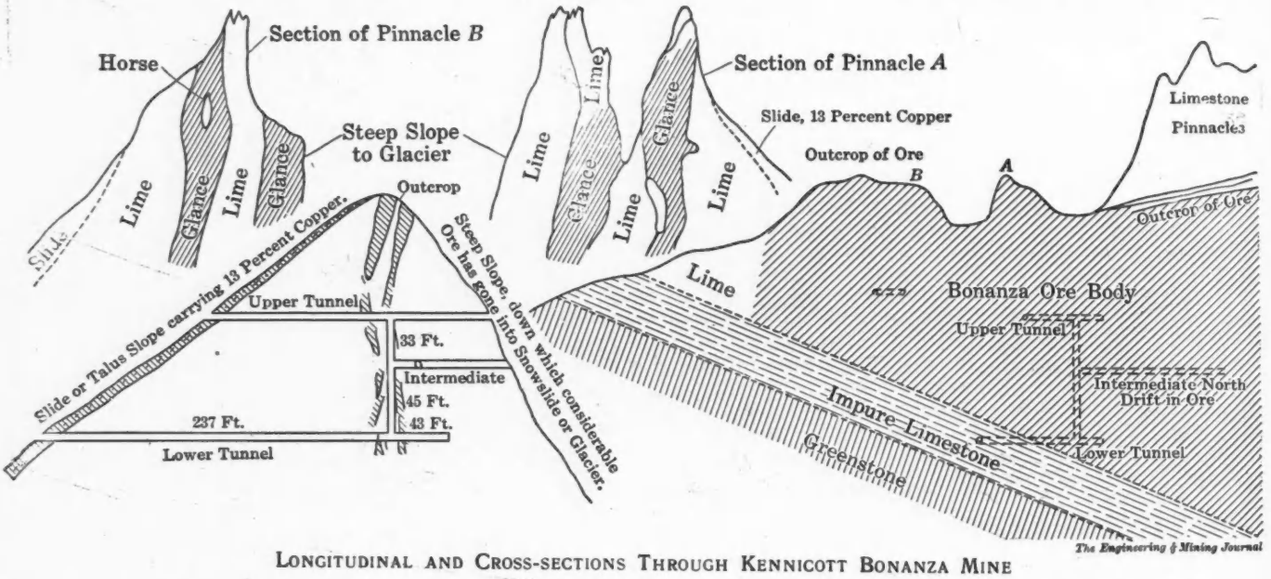
The most promising of these possibilities are those of the chamber deposits and the underground extension to the northwest. Indications are that some beds of the limestone are more favorable to ore deposition than others. The one whose outcrop exposes the Bonanza is evidently favorable and the ore may follow it back into the mountain, although not passing into the beds above or below.

Shipments Await the Railroad

Hand mining is practised altogether, something over a dozen men being employed underground. Miners receive $4.50 per day of eight hours, surface men $4. The charge for boarding is $1.25 per day. When railway transportation is available, equipment for working on a larger scale can be provided. The slide will probably be worked by a system of cuts.

Treatment will be ordinary smelting, with previous rough hand sorting for the rich ore, and probably mechanical concentration for the lower-grade ore, perhaps including the slide.

Preparations for shipping as soon as the railway is finished, are about complete. An aërial tram to bring the ore from the mine to the lower camp near the glacier was finished in 1909. It was made and installed by the Trenton Iron Works. The total length is 15,000 ft.; difference in elevation of terminals, 4000 ft.; diameter of carrying rope 1¼ in.; diameter of hauling rope, ⅞ in.; capacity of buckets, 5 cu.ft.; speed, 500 ft. per



Longitudinal and Cross-sections Through Kennicott Bonanza Mine

min. It is built in two sections, the upper, 7000 ft. long, delivering its loaded buckets to and receiving empty ones from the lower section, which is 8000 ft. long. The longest single span is 1500 ft. All the lumber and timbers for its construction were sawed out of native spruce by a sawmill of 10,000 ft. daily capacity at the lower camp.

Besides the sawmill there are at the lower camp a boarding house with accommodations for 50 men, a large stable, warehouse and a small log office building. At this camp the railway will receive the ore for shipment, 196 miles to Cordova. There it may be transhipped by sea to a smeltery, or possibly treated there in a smeltery built for the purpose. About 100 miles of the railway are built, and by the end of 1910 it is proposed to have it finished to the mine and in operation.

Mineral Deposits on Private Land Claims

SPECIAL CORRESPONDENCE

Mr. Andrews has presented a bill in the House of Representatives which has been given some serious consideration within the last few days by members of the committee on mines and mining, and some action may shortly be taken with respect to it. The bill in question is intended to authorize the exploration and purchase of mines within the boundaries of private land claims.

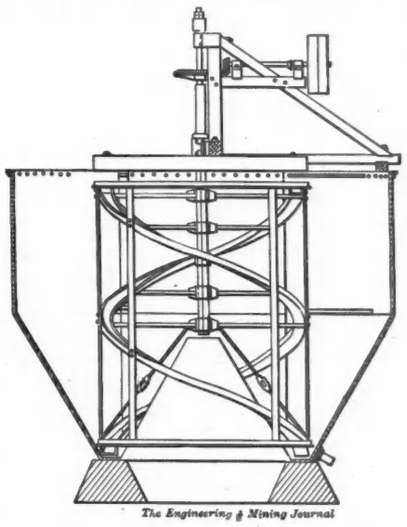
The first section of the bill contains the fundamental proposition of the measure and provides: "That hereafter all gold, silver and quicksilver deposits, or mines, or minerals of the same, on lands embraced within any land claim confirmed, or hereafter confirmed, by the decree of the court of private land claims, and which did not convey the mineral rights to the grantee by the terms of the grant, and to which such grantee has not become otherwise entitled in law or in equity, are hereby declared to be free and open to exploration and purchase under the mining laws of the United States, the local mining laws and regulations, and such regulations in addition thereto and consistent therewith as may be prescribed by the Secretary of the Interior from time to time, by citizens of the United States and those who have declared their intention to become so."

In section 4 it is provided that the locators of all such mineral claims shall within the period of 90 days take steps to "acquire the lawful right to use the surface ground embraced within the limits of such claim and necessary access thereto, and they are hereby authorized to acquire the same by condemnation under judicial process: *Provided*, That before beginning such condemnation proceedings the locator shall tender to the owner of the land in which such mineral claim is located the sum of $2.50 per acre in full payment for the said surface ground, and the receipt of such sum by the owner of the land shall authorize the immediate entry of the locator upon such land."

Several sections are concerned with the filing of notices, marking of boundaries and various other details.

Pulp Agitator

R. W. Gordon, of Denver, Colo., has recently patented (U. S. Pat. 954,511) a device for agitating cyanide solutions. The machine consists of a tank, in which a revolving conveyer raises the settled particles from the bottom of the tank discharging them at the top where they again settle to the bottom. The settling sands gather at a certain place on account of the construction of the lower wall of the tank and the insertion of a cone in the bottom of the tank. The rotation of the conveyer constantly elevates the settled particles of ore and discharges them at the top. This gives rise to three vertical currents, one upward in the path of the conveyer and two downward. The rotation of the pulp solution is prevented by baffles. The device is claimed to be particularly adapted for use ahead of filters to deliver a homogeneous feed either continuously or intermittently.



GORDON PULP AGITATOR

Long Service of a Blast Furnace

The Jones & Laughlin Steel Company is taking down Eliza furnace No. 1 at Pittsburg, in order to replace it with a new stack. Eliza No. 1 was built in 1889, rebuilt in 1893 and again in 1901, its size being then 100x22 ft. Since 1901 it has made 1,331,000 tons of pig iron, an average of nearly 148,000 tons a year.

Rand Mines, Ltd.

SPECIAL CORRESPONDENCE

The Rand Mines, Ltd., owns a number of separated deep-level mines on the Rand. The chief subsidiary is the Crown Mines Ltd., which is engaging in a friendly rivalry with the East Rand Proprietary Mines, Ltd., to be the largest gold producer. At this mine also the crushing capacity is to be increased to 200,000 tons per month and it is aimed to develop 11,000,000 tons within two years. Reserves on Dec. 31, 1909, were, however, only 4,000,000 tons so that the East Rand Company has a long start. The profit of the Rand Mines, Ltd., for 1909 was £1,994,655. The subsidiary companies mined 4,145,785 tons of which 3,651,084 tons were crushed. The average yield was 31s. 1.72d. ($7.57) per ton, costs being 18s. 3.984d. ($4.46) per ton, profit 12s. 9.74d. ($3.11) per ton.

The most interesting portion of the report is, however, the chairman's remarks in regard to low working costs which may be compared to remarks made at meetings held during the last two years and to the remarks of the chairman of the East Rand Proprietary Mines.

In summing up his views upon the "idol of low working costs" the chairman of the Rand Mines, Ltd., states: "Clearly the less waste that is mined under a given unit of superficial area the richer will be the mining and milling charged to it, and the greater will be the profit." And referring to the new mining system being adopted, he says, "The whole idea of this new system is to encourage careful and conscientious mining, and to get good work done."

SAND FILLING FOR STOPES

Sand filling of stopes by means of water is to be more largely adopted and the mines have availed themselves of the services of J. Walen, a German expert on this system of filling. It is expected that sand filling of the stopes will enable mechanical ventilation to be more easily carried out as air currents will not be divided and dispersed in the large open areas of abandoned workings, but will be confined to the levels.

The 1909 report of the General Electric Company shows that the company has invested in copper properties $1,129,961, represented by capital stock, and $1,918,642 by advances. These investments include the Bully Hill Copper Mining and Smelting Company, Winthrop, Shasta county, Cal., a railway company and other equipments, and the properties of the Hermosa Copper Company, Grant county, N. M. Liberal sums have already been spent in developing these properties.

Changes in Mine Regulations During 1908-1909

Fourteen States enacted new or amendatory laws which may be considered under this head during the years 1908 and 1909, Oklahoma enacting its first law on this subject and Idaho doing practically the same.

Oklahoma

The Oklahoma statutes direct the preparation and furnishing of maps; prescribe methods of working; the provision of two exits; of passage ways around shafts; the supply of shields for mining machines; speaking tubes; timbers; installation of electric wires; construction of shelter holes along travel ways; require wash rooms to be furnished; supplies to be provided for first aid in case of injury by accident; direct employment of shot firers, and of mine foremen where more than 10 workmen are employed; and regulate the construction and operation of hoists and the use of explosives.

The weighing and screening of coal are regulated, and the employment of convicts in mines is prohibited. An inspector of mines is to be elected, and the State divided into three districts, each with an assistant inspector, such assistants also to be chosen by popular vote from and after 1910. The laws of Oklahoma relate principally to coal mining.

Idaho

The law of Idaho is adapted to the operation of mines of minerals other than coal. The Idaho statute first makes provision for security in case of fire, both by prescribing the furnishing of extinguishers and by directing the installation of fire doors. New buildings, timber sheds, and the like are to be constructed only at a safe distance from the entrance to the mine, except where necessary as a protection against the snow. The collars of shafts and all openings in mines are to be safeguarded so as to prevent the falling of persons or objects therein; safety hoists are to be constructed according to prescribed requirements, and indicators furnished so that the engineer will be able to know at any time the exact location of the bucket or cage.

Other provisions relate to the storage and use of explosives, storage of oils, and the employment of hoisting engineers, who must be at least 21 years of age, of proved experience and qualifications, and not addicted to the use of intoxicating liquors. Electric wires are to be insulated or otherwise properly guarded; a code of signals adopted, and prescribed means of exit arranged for.

Inspectors in Various States

Laws relating to mine inspectors were passed in several States, including Kentucky, Montana, Nevada, Ohio, and Wyoming. The Kentucky statute provided for two additional inspectors, and requires all inspectors to pass an examination to determine their competency before being appointed. In Montana, also, the inspector must pass an examination before appointment, this provision being substituted for the earlier requirement of graduation from a school of mines.

The Nevada law created the office of inspector of coal mines, the incumbent to have had seven years' experience in underground workings; he is given authority to enter and inspect mines, order changes, and to investigate accidents, and annual reports are required to be made to the Governor of the State.

Quarterly Inspections in Ohio

The law of Ohio provides for the appointment of three additional inspectors, making the number of inspectors and inspection districts 10, instead of seven, as before; the chief inspector must have had five years' experience and be acquainted with the uses and dangers of electricity in mines. The same act directs that at least quarterly inspections be made, instead of "as often as possible," as in the earlier law; a map or plan must also be furnished for each vein worked, and more efficient provisions were enacted for the securing of ventilation. This law also directs that shaft men be employed to attend hoists; that self-dumping cages be not used unless they can be securely locked; and that shelter holes be furnished for the use of door boys.

The Wyoming statutes reduces the terms of mine inspectors from six years to two, and establishes their offices in the inspection districts instead of at the State capital; inspectors are made police officers, with power to make arrests for violations of the mine laws, and may order workings closed if their directions are not complied with. Detailed annual reports are required, covering the subject of inspections made, accidents, their causes and remedies, and suggested methods for the safe operation of mines.

The Use of Explosives

Other statutes were enacted, covering a variety of details connected with the operation of mines, the use of explosives, the handling of workmen, etc. Thus, a statute of Kansas regulates blasting, prohibiting the use of dynamite except under rules agreed upon by employers and employees and approved by the State mine inspector; employees are not to be sent into any sinking shaft or development work after a charge of dynamite or other detonating explosive has been fired, until the smoke and gases are removed. Another Kansas statute directs the sprinkling or removal of dust from mines, requires all drill cuttings to be removed at least 15 ft. before shots are fired, and prohibits the use of coal drillings for tamping.

Mine explosives are the subject of an Ohio statute, which regulates the sale, storage, size of packages, and the locking and opening of boxes containing explosives used or to be used in mines; the tamping of charges and the firing of shots are also regulated by this law.

Inspection of Equipment

Semi-weekly inspections of ropes, cages, catches, brakes, etc., used for hoisting men are directed by a statute of Missouri, the reports of such inspection to be recorded. Another statute of the same State requires shaft men to be employed where men are hoisted, regardless of the power used, instead of only where steam is used as a motive power, as provided in an earlier law.

A statute of Ohio directs the insulation of electric wires and the installation of shields on mining machines. A Wyoming statute provides for the sprinkling of dusty places, and the monthly removal of accumulations of dust, including slack, machine cuttings, and track cleanings. The law of Pennsylvania is changed only by adding certain counties to the anthracite-coal inspection districts and by repealing the act of June 10, 1883, which prescribed the method of determining the amount of clean coal for which payment should be made to the miners.

Safety Lamps

The exclusive use of safety lamps, magnetic locked, air locked, or lead locked, is prescribed in gaseous mines in Washington, except by superintendents, foremen, and certain designated employees, who may use other lamps of a type approved by the State mine inspector. Safety lamps are to be the property of the operator of the mine. Other laws of this State provide that weekly measurements of the quantity of air furnished for ventilation are to be made, and a record thereof kept; and amend the laws relative to maps, plans, etc., directing signboards to be placed at the intersection of ways, so as to indicate the most direct means of exit from the mines.

Compressed Air

The New York legislature enacted a law regulating employment in mines and tunnels, applicable chiefly to tunnel work where the employee is exposed to conditions induced by the compression of air. The hours of labor are regulated according to the degree of air pressure, ranging from eight hours, with an interval in

the open air of 30 min., if the pressure does not exceed 28 lb. per sq.in., to two hours when the pressure equals 46 lb. per sq.in. and is less than 50 lb.; this period of two hours is to be divided into periods of one hour each, with an interval of not less than four hours. Employment under a pressure of more than 50 lb. is prohibited except in case of emergency.

Intermediate locks or stages of decompression must be provided for employees leaving work. Employees who have worked three months continuously in compressed air must be examined by a medical officer and may not again work unless shown to be physically qualified therefor; nor may an employee who has been absent from his work for three or more successive days for any cause, be permitted to resume work without reëxamination. All applicants for employment must be examined, and if they have not previously worked in compressed air they shall not be permitted to work during the first 24 hours of employment more than one-half the period provided for in the section regulating the hours of labor. After this first day's work, they must be reëxamined and may not be permitted to work unless of approved physical condition. A medical locker and supplies, with a medical attendant in charge, must be maintained and be at all times available for the use of employees. Properly heated, lighted, and ventilated dressing rooms, with baths, toilets, and hot and cold water service, must be supplied.

Notes on the Aluminum Industry in France

BY TONY CALLOT*

The principal French deposits of bauxite are situated in the departments of Hérault, Bouches du Rhône and Var, in the southern part of France. This raw material occurs in two characteristic varieties—white and red. The former contains but little iron and much silica and is used mainly for the manufacture of sulphate of aluminum. The latter is particularly well adapted to the manufacture of pure alumina.

Between those two kinds of ore there are a number of intermediate varieties in which silica takes the place of Fe_2O_3, while the amount of Al_2O_3 present varies between 55 and 70 per cent. We may even quote a variety nearing the hydrargillite yielding 78 to 80 per cent. Al_2O_3, almost no Fe, 2 to 3 per cent. SiO_2 and 2 to 3 per cent. TiO_2. Unhappily this variety is a rare one, but has been found at Loupian (Hérault). In the department of Hérault the bauxites do not form regular deposits; their composition varies constantly, and only frequent chemical analyses enable the miners to prepare homogeneous shipments of ore.

SKETCH MAP, SHOWING SITUATION OF FRENCH BAUXITE DEPOSITS

In Bouches du Rhône, where bauxite was first utilized as an aluminum ore, the quarries are of small importance and the mineral is too high in silica. The bauxites of Les Baux and Iaradon are used principally by the makers of firebrick.

BEST FRENCH BAUXITE FOUND IN VAR

The best ore is found in the Department du Var, where it is shipped under the formal guarantee of a minimum of 60 per cent. Al_2O_3 and a maximum of 3 per cent. silica. This ore is red and homogeneous; its specific gravity is low, and it may be crushed easily without leaving any residue. Some white grains of almost chemically pure alumina are occasionally seen in the ore.

The best quarries in this district are owned by the Société Electrométallurgique Française and by a recently incorporated company controlled by the Guilini Brothers, of Ludwigshafen. The former company treats about 40 tons per day at the Gardanne works; 12 to 15 tons are also dealt with at Salindres. This bauxite is also shipped to Germany, England and America.

TREATMENT OF THE ORE

Two processes are used in France to obtain alumina from the bauxite. The Société Electrométallurgique Française at Gardanne uses the Bayer process. The crushed ore is attacked under pressure by a solution of caustic soda, thus producing aluminate of soda which is separated by filtration. The aluminate of soda being unstable, alumina precipitates

*Mining engineer, 160 Boulevard Malesherbes, Paris, France.

spontaneously. It is advisable to aid this precipitation by adding some alumina previously prepared, or by agitation of the solution.

The precipitated alumina is practically free from silica and phosphorus, and has a sandy appearance. It is easily cleaned by washing, and then calcined, yielding Al_2O_3, which is suitable for the manufacture of aluminum. The Gardanne works produces 20 tons of Al_2O_3 per day.

The other process was used at Salindres 30 years ago. It was then abandoned until 1897 when the Société Pechiney undertook the manufacture of aluminum at Calypso, St. Michel de Maurienne. Many German and Austrian works have used it. In this process the pulverized bauxite is charged with carbonate of soda in ordinary soda furnaces. The aluminate of soda thus obtained is dissolved in hot water, separated by filtration from the iron oxide, then purified and decomposed by CO_2, which causes the alumina to precipitate. The remainder of the process is similar to that of Dr. J. Bayer. The Salindres works produces at least 6 tons of alumina per day.

Large Consumption of Electric Power

Aluminum is extracted from alumina by electrolysis when the material is melted in an electric arc. This process was invented by Mr. Héroult and patented in 1886. The graphite crucible forms the cathode, and the alumina is dissolved in a flux of fluorspar and chryolite.

The large amount of electric power required (a horsepower-year producing 200 to 250 kg. of aluminum) has caused manufacturers to erect their works close to big water falls, mainly in the Alps along the valley of the River Arc. This valley is called la Maurienne. Thus the Société Electrométallurgique Française utilizes 56,000 h.p.; the Compagnie des Produits Chimique, d'Alais (Pechiney & Co.), 50,000 h.p.; the Société d'Electrochimie and others, about 66,000 h.p.; making a total of 150,000 h.p. All this power is not at hand throughout the year, and it is also partly used for the manufacture of special setels. Probably about 100,000 h.p. is used for aluminum furnaces.

Goldfield Consolidated Mill Operations

BY JOHN TYSSOWSKI

During the last year or so many changes of method and equipment have been inaugurated at the new 100-stamp mill and cyanide plant of the Goldfield Consolidated Mines Company. As a result excellent cost and extraction records have been made and a stamp duty attained that is comparable to the records made on the Rand. At the present time between 8½ and 9 tons of ore per stamp are being crushed though ¼-mesh screens per 24 hours with 1050-lb. stamps.

Treatment

The treatment scheme now adopted is to crush in stamp batteries to ¼-in. or smaller size, classify in three-compartment boxes, recrush to 20 mesh in chilean mills and elevate to settling cones. The overflow from these is under 200 mesh. The underflow passes to Dorr classifiers and then to tube mills.

The combined slime discharge, all under 200 mesh, goes to Deister tables, concentrates from which are run over amalgamation plates to remove free gold. Tailings pass to the cyanide plant where the treatment scheme includes agitation in Pachuca tanks, filtration in Butters filters and zinc-dust precipitation of the gold, the precipitate being recovered in Merrill filter presses. Concentrates are treated by a special cyanide process devised by J. W. Hutchinson. There is a separate plant for this work. Shortly after my visit a portion of the mill was damaged by fire, but I understand that the treatment scheme will be unchanged.

Mill Machinery

For each 50 stamps there is one three-compartment classifying box the pulp from which is distributed to chilean mills. There are three of these, which are 6-ft. Monadnock machines built by the Trent Engineering Company, Reno, Nev. They are run at 30 r.p.m. The bucket elevators, two in number, are housed in steel and run at 420 ft. per min. Each delivers to an 8-ft. settling cone, the underflow from which feeds three Dorr classifiers. The Gates tube mills, three to each side of the mill, are 5x22 ft. and are run at 26 r.p.m. Coarse discharge joins that from the chileans and is re-elevated, classified and again ground in the tube mills. As stated, everything, after being reduced to 200 mesh, passes to Deister concentrators of which there are 78 primary and 16 secondary tables.

The Pachuca cyanide-agitation tanks are 15 ft. in diameter by 45 ft. high. About 40 cu.ft. of free air per minute at 25-lb. pressure are required for each charge of 100 tons of dry feed. The dilution of the pulp is about 1½ to 1 (1.30 sp.gr.). The usual agitation period is 16 to 18 hours in a 1-lb. KCN solution carrying 0.5 lb. CaO: Pb $(C_2H_3O_2)_2$ is added at the ratio of ½ lb. per ton. The Butters filter cycle is 3 hours; tailings contain about 35 per cent. moisture.

Extraction

The excellence of the results obtained at the Goldfield Consolidated mill is proof enough of the efficiency of the treatment scheme and operations. Late returns show that a total gold recovery of over 93.7 per cent. is being made, 70 per cent. of the metal being recovered in concentrates (which represent 4¾ per cent. of the tonnage treated) and 23.7 per cent. in the cyanide plant. In cyaniding the concentrates a 96 per cent. gold saving is claimed, this making a total net recovery of 90 per cent.

The water consumption in the mill is only 0.8 ton per ton of ore crushed. Battery heads are kept up to at least $30 per ton. The consumption of cyanide per ton of ore crushed is 1.51 lb.; of lime, 7.31 lb.; zinc, 1.31 lb.; lead acetate, 0.88 lb.; water as stated, 0.8 ton. These figures include the treatment of concentrates.

Segregated Costs

Considering the high grade of the ore treated, the high cost of labor, power and supplies (ordinary day labor costs $4 and power $6 per horsepower-month) a remarkable showing is also being made in the matter of milling costs. For November, 1909, a complete segregation of the milling costs per ton of ore crushed is: Crushing and conveying, $0.049; sampling, 0.012; stamping, 0.21; amalgamating, 0.051; elevating and separating, 0.012; tube milling, 0.202; superintendence, 0.069; concentrating, 0.054; neutralizing, 0.041; settling, 0.047; agitation, 0.382; filtration and discharging (includes cost of upkeep of tailing dam), 0.089; assaying, 0.056; stable, 0.002; precipitating, 0.146; refining, 0.230; water, 0.114; surface, etc., 0.006; steam heat, 0.024; watching, 0.048; storehouse and office, 0.033; lighting, 0.016; general, 0.005; electrical department, 0.007; mechanical department, 0.002; total, $1.907. The average for 1909 was $2.04 per ton of ore milled.

The technical skill of the men in charge of the operations and the excellent accounting system which makes such close segregation of charges possible, no doubt explain the results obtained at this mill. For the data herein contained I wish to acknowledge my indebtedness to J. W. Hutchinson, mill superintendent, and E. A. Julian, former assistant.

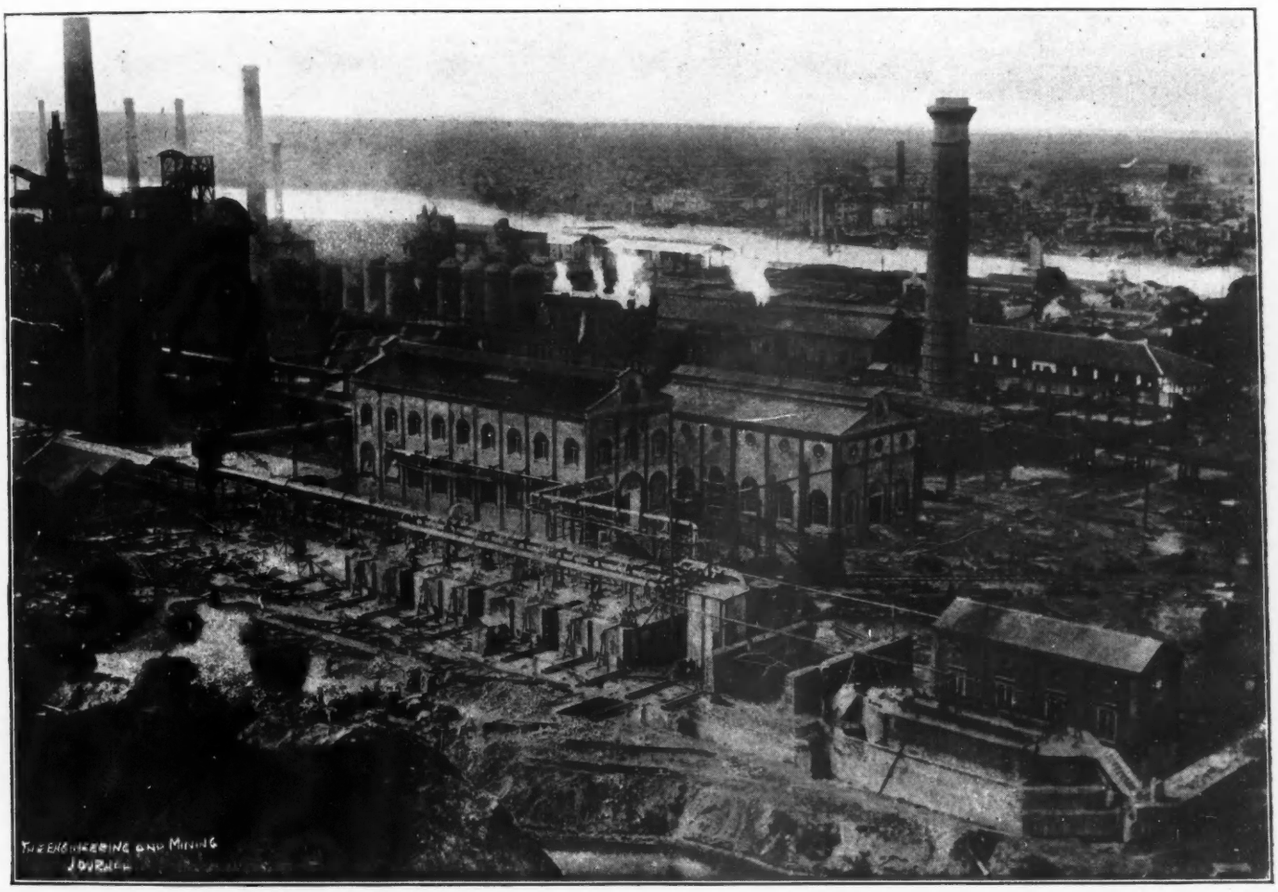
Iron and Steel Works at Hanyang, Hupe, China

Latest German Equipment Used for Making Pig Iron, Steel, Rails, Plates, etc. Little Use for Labor-saving Machines in Mining

BY A. J. SELTZER*

The Hanyang iron and steel works is the only one in the whole of China which is producing steel. No better illustration of the conservatism of the Chinese people need be cited than the above statement, for it is well known to all who have traveled at all extensively in this ancient empire that there are huge deposits of excellent iron ore in almost every province. A little over twenty years ago one of the Shanghai viceroys decided to erect an iron works, but just at that time he was transferred to Hupe so the works was built in Hanyang instead of Shanghai. This placed it somewhat nearer the base of supplies, but it is now far removed from all of the raw materials.

During the first few years of its existence this plant made pig iron only, but in 1893 it began to make steel. Two small bessemer converters were installed, but owing to high phosphorus and other difficulties the government was unable to place the works on a paying basis, so it was abandoned in 1894 and fell into the hands of wealthy Chinese. The new owners engaged Belgium and French engineers who remodeled the two 60-ton blast furnaces, doubling their capacity, installed three 30-ton Siemens-Martin open-hearth furnaces, put in a rail mill, erected a blooming mill and built a foundry. Thus remodeled and enlarged the works began to turn out excellent rails.



GENERAL VIEW OF THE IRON AND STEEL PLANT AT HANYANG, CHINA

PRESENT PLANT AND EQUIPMENT

At the present time the plant consists of the two original but remodeled blast furnaces, four 30-ton Siemens-Martin open-hearth furnaces, one Wellman pig mixer, a 100-cm. reversing blooming mill, an 80-cm. reversing plate mill and a 10-ton furnace for melting scrap. The Siemens furnaces are fed with cold scrap part of the time, but for the most part they receive the molten pig from the Wellman mixer, the duplex process being used and the pig washed in an open-hearth furnace to free it of phosphorus. To increase the capacity and also to lower the cost of steel making it has been suggested that the combination process be used; that is, to take the molten pig from the pig mixer, transfer it to bessemer converters for upwards of 40 min. to eliminate practically everything but the phosphorus, then transfer it to the open-hearth furnaces.

The blooming mill, plate mill and also the rail mill are driven by powerful three-cylinder engines, the cylinders being 115 cm. in diameter and 150 cm. stroke. The rail mill is 75 cm., reversing, and there is also an 85-cm. beam mill. These mills are all modern German types and are equipped with electric cranes. The large mills have gas-heated Morgan continuous furnaces. The blooming mill

*Imperial Mining College, Wuchang, China.

has soaking pits for heating the ingots. The ingots are brought hot from the steel furnaces on the cars on which they are cast. All the steel is top cast, two ingots at once, the ladles having two stoppers. The ladles are handled by a 50-ton crane. The present rail mill has a capacity of 250 tons per day, rolling two rails from a bloom, and 85-lb. rails are made. It has been suggested that the rail mill be remodeled to roll rails direct from the ingot.

Water Jacketing Arrangement

The company is just completing a blast furnace of the latest German type. It is 32 m. high, diameter of the crucible is 3.15 m. and there are 16 tuyeres, eight to be used at a time and eight to be held in reserve. The interesting part of this furnace is the water-jacketing scheme, which is shown in an accompanying illustration.

Small cast-iron pans, 45 cm. long, 42 cm. wide and 11 cm. deep, are set into the brickwork around the outer circumference and flush with it, giving the outer circumference almost the appearance of a network of these pans from the tuyeres to within 3 m. of the top of the furnace. These pans are placed in horizontal rows around the circumference. The rows are 75 cm. apart and the horizontal distance between pans is 100 cm. The pans are so arranged that each pan in a row is not directly underneath one in the row next higher, but the space is so divided as to expose as little of the brickwork as possible. The interior end of each pan is closed, but the outside end has an open space or slit across the top, and through this a 3-cm. iron pipe passes to supply the cooling water. Another similar pipe leads out of the bottom of the pan at the other side and delivers the water to the next lower pan. Thus the water is kept in circulation throughout the network of pans. When the water has traveled through four pans it has become hot enough to go to the troughs which surround the furnace.

Construction Work

To give an idea of the slowness of construction in China, it might be mentioned that it has required three years to construct this furnace. This furnace represents the latest German patents and it will be interesting to see how these new ideas work out in practice. The foundation is already completed for another furnace precisely like this one and it is evident that the company intends to increase the output several hundred per cent. This new furnace will probably be blown in about Feb. 15. The walls are constructed of large firebrick and are strapped with strong bands, 2½ cm. thick and 12 cm. wide. It will be fed by hand buggies, as labor here is so cheap and plentiful that mechanical devices are scarcely considered.

A Mountain Range of Iron Ore

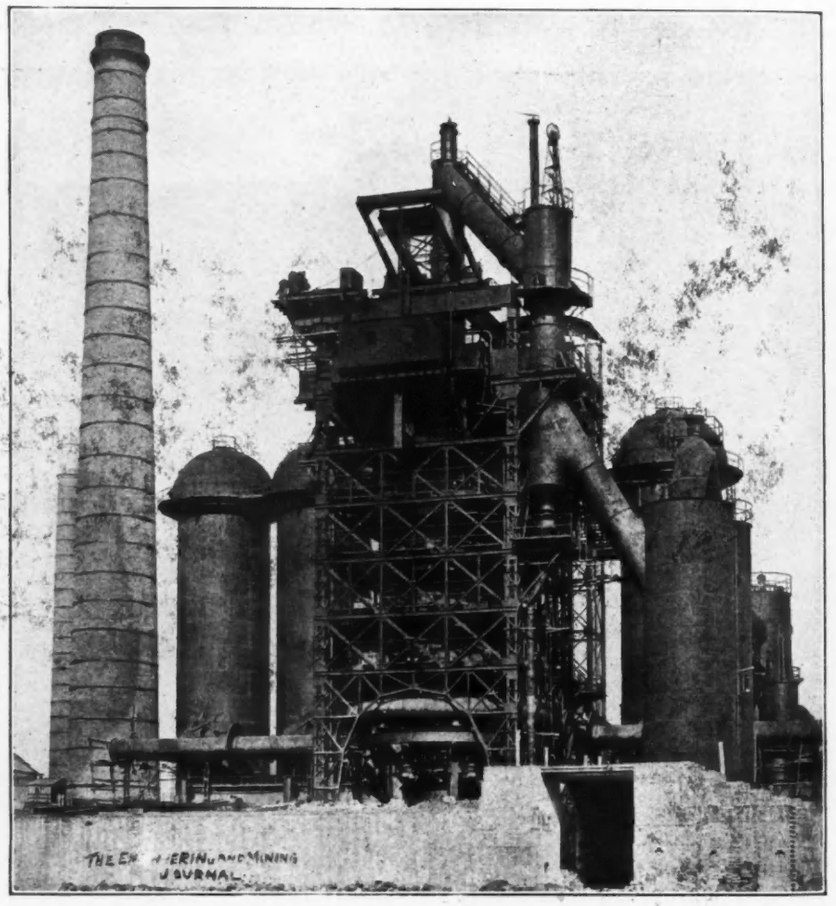
The company has its own iron and coal mines. The iron mines are situated at Tayeh, 145 km. down the Yangtse Kiang from Hanyang and 26 km. back from the river. Here there is really a mountain range of iron ore, the main orebody appearing in three hills, each 250 m. high. Two of the hills are quite near each other, being separated by a narrow valley; the third is at a distance of 6 km. and the vein is barren between.

A Contact Deposit

This is a contact deposit, the contact on the north wall being a compact, close-grained diorite, the south contact being a pure, almost white, marbly limestone. The diorite being very hard and not seriously affected by weathering, has not been eroded to any great extent and lies against the iron ore to its maximum hight. The limestone has been greatly eroded and in many places has left the hematite near the surface. The richest part of the range has a southeast-northwest trend, but just beyond this rich part the vein is almost barren and runs practically due east and west.

The ore is a good, hard hematite and it is necessary to blast most of it. The drilling is all done by hand and a poor driller is Mr. Chinaman. He is not only disgustingly slow, but it is practically impossible to convince him that the Western method of pointing holes is far superior to his ideas on the matter, and even after the holes have been marked for him he will often ignore the marks and place the holes according to his own views. The German engineer in charge of the mines informed me that one German driller would break as much ground as eight to ten Chinese.

The work in these iron hills is all open-cut, and as the ore is blasted it is sent down inclined planes in one-ton cars and loaded into 11-ton cars from an ordinary coal-tippling system, drawn to the river in trains of 12 cars and there loaded into the company's lighters and towed up to Hanyang by the company's steam launches. Each lighter holds 350 tons, and one launch tows two lighters. Practically no prospecting or exploitation has been done upon this wonderful deposit, so in reality but little is known of its contents below the ground level, or its continuity beyond these three rich hills.



The New German Blast Furnace at Hanyang, China

Output Will Be Increased

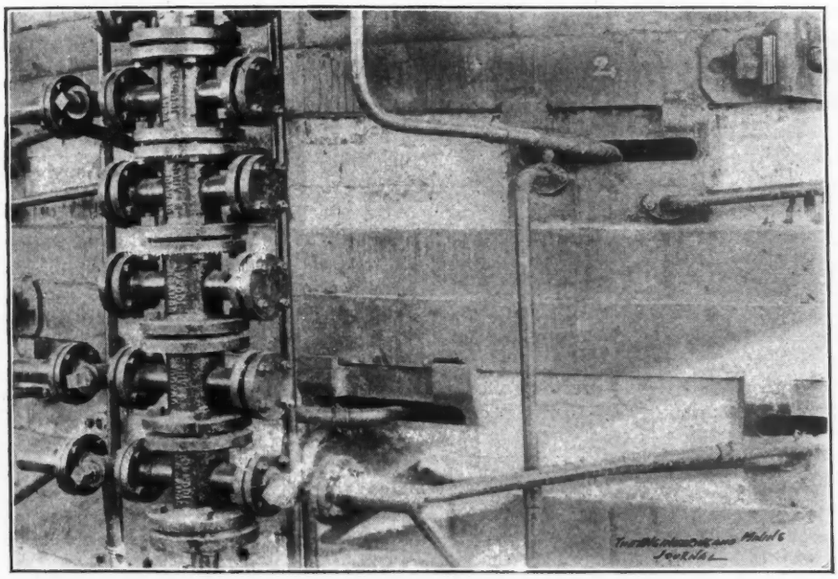
At the present time the Hanyang works is being supplied with 350,000 metric tons annually; next year this must be increased to 500,000; and 125,000 tons

goes to Japan each year. The present output from the three hills is about 1000 metric tons per day, but will soon be increased to 1600 tons. At the present output, the ore in sight will last 70 years, but there is every reason to believe that the vein not only increases in richness with depth but also grows wider.

The company's coal mines and coke ovens are situated at Pinghsiang, which is about 300 km. up the Yangtse Kiang from Hanyang and 175 km. south of the river. Here are the second largest coal mines which are being operated in China. There are 280 coke ovens, and besides supplying coal and coke for the Hanyang works, these mines supply both coal and coke for a large number of steamers, foundries, etc. The Hanyang plant receives at present 160,000 tons of coal and 110,000 tons of coke per year from these mines, and this amount is soon to be materially increased.

PRODUCTS AT HANYANG.

	Foundry Pig Iron, Per Cent.	Basic Pig Iron, Per Cent.	Open-hearth Steel, Per Cent.	Finished Steel, Per Cent.
C....	3.8	3.9	3.34	0.40
Si...	2.5	0.65	.....	0.085
Mn..	1.0	1.10	0.26	0.089
S....	0.01	0.045	0.24	0.055
P...	0.02	0.25	0.045	0.028



SYSTEM OF WATER JACKETING THE NEW FURNACE

WAGES AND LABOR CONDITIONS

About 15,000 men are employed at the iron mines, steel works and collieries. The following is the schedule of wages at the coal and iron mines per day of ten hours: Miners, 250 to 300 cash (8 to 9.5c.); loaders and pushers, 100 to 150 cash (3.25 to 5c.); tippling coolies, 100 to 125 cash (3.25 to 3.75 c.); small boys and old men who carry the ore in wicker baskets, 80 to 120 cash (2.65 to 3.65 c.). The cost of mining one ton of ore is 270 cash, or 9c., and stripping cost per ton of ore is 30 cash, or 1c. gold.

The scale of wages at the steel works is a little higher and is about as follows: Rollers on mills, 350 to 700 cash (10.5 to 21c.); heaters on furnaces and open-hearth steel melters, 550 cash (29c.); helpers on furnaces, 350 to 500 cash (10.5 to 27c.); first helpers, 350 cash (10.5c.); blacksmiths, 700 to 1000 cash (21 to 34c.); common labor, about 7.5c. gold per day, and boys and women about 5c. The men at the steel works work fairly well, but the miners are shiftless, resembling the Mexican in that they will work just enough days per month to provide sustenance, but no more. They work on an average of 21 days per month.

ANALYSES OF ORES AND PRODUCTS

The following analyses are of the ores at Tayeh, the coal and coke at Pinghsiang and the products at Hanyang:

ANALYSES OF TAYEH ORES.

	Hematite, Per Cent.	Brown Iron Ore. Per Cent.	Magnetite. Per Cent.
Fe.....	62	48	65
Mn.....	0.3	7.0	0.13
SiO_2.....	4.0	6.0	3.0
Al_2O_3.....	2.0	....	....
S.....	0.02	0.01	0.06
P.....	0.05	0.03	0.12

The Tayeh limestone is of good quality, containing 96 per cent. $CaCo_3$. The Pinghsiang coal contains: Ash, 10 to 25 per cent.; volatile matter, 25 to 35; sulphur, 0.2 to 0.6 per cent. The coke contains: Ash, 10 to 25 per cent.; sulphur, 0.3 to 0.6; phosphorus, 0.06 to 0.25 per cent.

The analysis of blast-furnace slag is as follows: SiO_2, 33 per cent.; Al_2O_3, 16; CaO, 46; MgO, 2; Fe, 1; Mn, 0.60 per cent.

The steel made by this plant is of an excellent quality in every respect. The rails for the Peking & Hankow railroad were furnished by this company and it is now making rails for the Canton & Hankow railway and the new road that is being built to Chang Sha. The following two tests are among the most severe to which the rails are subjected: An 85-lb. rail, 3 ft. 6 in. between supports, stood a weight of 40 tons for five minutes, with a permanent deflection of 3/16 in.; a drop test of one blow with a 2200-lb. weight, falling 25 ft. caused a 2.5-in. deflection.

ACCIDENTS COMPARATIVELY RARE

His Excellency V. K. Lee, a versatile Chinese, is the general manager, and all the other responsible positions and heads of departments are filled by German engineers and metallurgists. The lesser foremen are Chinese and they are exceedingly proud of their positions. The thing which impresses one most on entering the plant is the almost innumerable heaps of scrap, old brick and mortar, junk of all descriptions, that are piled about in almost every part of the works. No general junk yard is set apart, but the whole plant from end to end is littered up with junk. This is, of course, in strict keeping with the Chinese mode of living.

Over 5000 Chinese are on the payroll at this plant; they swarm about each operation as thick as bees about a honeysuckle, and it is next to impossible for one to understand why they are not burned, scalded, crushed and killed by the score. Taking into consideration the fact that the Chinese are a playful and usually careless people, the small number of accidents which occur is almost marvelous. Of late years the company has been installing electric motors, hoists, etc., and a great deal more of the work is being done by machinery. However, because of the abundance and cheapness of Chinese labor, hand labor is resorted to wherever practicable. One sees all the coke being loaded and carried about in bamboo baskets on the shoulders of the coolies and the blooms and ingots being pulled about with tongs by the coolies; all handling of the rails is done by hand. These men become expert in the handling of steel and pig iron, and as blacksmiths and foundrymen they are also efficient.

INSTANCES OF CHINESE SUPERSTITION

Many interesting incidents of the gross superstition of the Chinese people might be related in connection with this plant. Owing to the company's rapid expansion in the last few years it is now cramped for ground, being hemmed in on one side by the Han river, on another by the mighty Yangtse Kiang, on the third by the Government arsenal and on the fourth by Turtle hill. There is only one method of escape and that is through the sacred Turtle hill. About three years ago the company proposed tunneling

through this barren and unused hill, but a great cry immediately arose from the people, and even the gentry. Protests came from all sides, that if the company tunneled the hill it would disturb the sacred dragon, greatly anger him and bring disaster upon the people. So extensive was the protest that the company was forced to abandon the proect.

The company then began to fill in a small marshy pond, which was near the base of the hill—again a wild protest, this time that the dragon washed his feet in this pond and that his bathtub should by no means be disturbed. Through strenuous efforts the company persuaded the people that it wished only a small part of the pond filled and would leave a wholesome bathtub for the honorable Mr. Dragon. As it is essential that the company secure more ground, and this Turtle hill is the only possible way of acquiring it, it is now endeavoring to convince the Chinese that it will neither bring disaster and destruction on the people nor anger the dragon.

It is interesting to note that several large shipments of pig iron have gone to New York from the Hanyang works. In November a shipment of 50,000 tons left for New York, and about six months earlier another large shipment went to the United States. Pig iron from Hanyang can be laid down in New York for less than the price quoted in Pittsburg. The Hanyang plant is a wonderful development for China and it is earnestly hoped that it will mark a new era for this conservative people.

Calculation of Recovery in Concentration

BY THEODORE J. HOOVER *

It frequently happens that some idea is desired as to what recovery is being secured in tests or in milling operations when it is not possible to get the weights of the products. The following formulas are believed to be absolutely sound in theory, but it should never for a moment be lost sight of that they are founded on the following assumptions:

(1) That the samples taken represent, without any error whatever, the average of the material.

(2) That the assays of the samples are absolutely correct.

Ratio of Concentration and Recovery

Having granted the two above assumptions, we can combine and transform certain symbols and get expressions for percentage of recovery and ratio of concentration which contain only the known quantities, to wit: Assay of ore, assay of tailings, and assay of concentrates.

Of the known quantities, let a = assay of ore; b = assay of tailings; and c = assay of concentrates.

For unknown quantities, let x = tons of ore; y = tons of tailings; and z = tons of concentrates. The following equations are self-evident:

$$\frac{x}{z} = \text{ratio of concentration.} \qquad (1)$$

$$\frac{100\,c\,z}{a\,x} = \text{per cent. of recovery.} \qquad (2)$$

$$a\,x = b\,y + c\,z. \qquad (3)$$

$$x = y + z. \qquad (4)$$

Now, by a proper transformation of equations (3) and (4), we can get expressions for (1) and (2) containing only the terms a, b and c, as follows: Multiply (4) by b and subtract the product from (3):

$$a\,x = b\,y + c\,z$$
$$b\,x = b\,y + b\,z$$
$$a\,x - b\,x = c\,z - b\,z$$

Transforming, we have:

$$x\,(a - b) = z\,(c - b) \qquad (5)$$

or

$$\frac{x}{z} = \frac{c - b}{a - b} = \text{ratio of concentration,} \qquad (6)$$

or

$$\frac{z}{x} = \frac{a - b}{c - b}. \qquad (7)$$

Now, if we substitute (7) in (2), we have:

$$\frac{100\,c\,(a - b)}{a\,(c - b)} = \text{per cent. of recovery.}$$

As a result, then, we have the following two useful formulas:

$$\text{Per cent. of recovery} = \frac{100\,c\,(a - b)}{a\,(c - b)}.$$

$$\text{Ratio of concentration} = \frac{c - b}{a - b}.$$

It cannot be urged too strongly that the above formulas must be used with caution. When actual milling operations are being carried on and the weights of ore and concentrates are taken daily, and where there are smelter returns to be used as a check, these formulas are useful as a check on samplers and assayers.

Checking by Actual Weights

In small tests where careful hand samples are taken by several persons at different points in the concentrating scheme, and taken in different ways, I have acquired sufficient confidence in the formulas to use them as guides in planning work; but ultimately all the results must be checked by actual weights of products. If the samples are taken and assayed with care, the recovery by weights in nearly all cases has checked up with the theoretical recovery as deduced by the formulas.

Errors which May Affect Results

An investigation of the effect of certain errors is instructive. Assume first a fixed error in sampling and assaying which we will call n per cent. too high. Then, by the formulas, per cent. of recovery =

$$100\left(\frac{(c + nc)\,(a + na - b + nb)}{(a + na)\,(c + nc - b + nb)}\right)$$

or

$$100\left(\frac{c\,(1 + n)\,[a\,(1 + n) - b\,(1 + n)]}{a\,(1 + n)\,[c\,(1 + n) - b\,(1 + n)]}\right)$$

But $1 + n$ cancels out, and it is evident a constant error does not effect the result. This, however, is a condition of affairs which rarely holds in actual practice.

More often the condition will be somewhat as follows, though not often would the errors be so large:

(1) Sample *A* taken by trier out of trucks; error of, say, 1 per cent. too high.

(2) Sample *B* taken by tip sampler at flume at end of mill; error of, say, 2 per cent. too low.

(3) Sample *C* taken by trier out of trucks from concentrates bins; error of, say, 2 per cent. too high.

(4) Assays of *A*, *B* and *C* made volumetrically by a man who does not reach the end point of his titration by say 0.1 c.c. This error, for convenience, we will say is 3 per cent. too low on ore, 10 per cent. too low on tailings, and 1 per cent. too low on concentrates.

Applying these erroneous values in our formula, we have the percentage of recovery as follows:

$$\text{Recovery} = 100\left(\frac{\left(c + \frac{2c}{100} - \frac{c}{100}\right)}{\left(a + \frac{a}{100} - \frac{3a}{100}\right)} \times \frac{\left(a + \frac{a}{100} - \frac{3a}{100} - b - \frac{2b}{100} - \frac{10b}{100}\right)}{\left(c + \frac{2c}{100} - \frac{c}{100} - b - \frac{2b}{100} - \frac{10b}{100}\right)}\right)$$

Simplifying, we have

$$\text{Recovery} = 100\left(\frac{c\left(a - \frac{88\,b}{98}\right)}{a\left(c - \frac{88\,b}{101}\right)}\right).$$

*General manager, Minerals Separation Company, Ltd., 62 London Wall, London, E. C., England.

Now, if the true values are: Ore, 3 per cent.; tailings, 1 per cent.; and concentrates, 12 per cent., the real theoretical recovery would be 72.7 per cent., but by the erroneous assay values secured in the above sample the theoretical recovery seems to be 75.3 per cent.

As large errors were assumed in sampling and assaying, much larger, in fact, than any engineer would be inclined to admit possible in his case, what shall we say of those cases where the discrepancy in actual operations between the theoretical recovery and actual recovery is much greater than the difference between 72.7 per cent. and 75.3 per cent. and generally in the opposite direction? It is quite a common thing for engineers to belittle recoveries based on theory, and in order to see just what this means let us take another case not more radical in its assumptions than many within the knowledge of most engineers.

For this purpose I shall define three terms:

(1) The real theoretical recovery. By this I mean the unattainable figure which would take into account every atom and molecule; this figure no one ever knows, but we try to get at it approximately by our samples and analyses.

(2) The apparent theoretical recovery. This is based on applying the above formulas to the figures we have secured by sample and assays as representing the value of ore, tailings and concentrates. As shown above it takes a large strain on our credulity to allow the apparent theoretical recovery to exceed the real theoretical recovery by 2.6 units.

(3) The actual recovery. This is shown on the books of the mine by the assays and weights of the products. This amounts in known cases to as much as 10 per cent. below the theoretical recovery.

Having defined the terms we will assume: Real theoretic recovery, 75 per cent.; apparent theoretical recovery, 77.5 per cent.; and actual recovery, 67.5 per cent. As we have already strained our credulity in the interpolation of sampling and assaying errors, we must look elsewhere for an explanation of an error of 7½ units.

There are probably three chances of error which are independent of and do not contribute to the vitiation of samples and assays:

(1) Errors of moisture determination. Moisture determinations can, with proper care, be easily and accurately made. The error, which is often a large one, comes in the sampling rather than in the determination of the moisture in the sample; ores of wet or clayey mines and wet concentrates are difficult to sample accurately. If the moisture is reported higher than the truth, the percentage of recovery as derived from the assay and weight of concentrates will be too low. Conversely, if the moisture is reported lower than the truth, the recovery as derived from the assay and weight of the concentrates will be too high. A consideration of the various methods of taking samples of wet concentrates for moisture leads one to believe the commonest error is to report the moisture in concentrates too high, and so the actual recovery as calculated on this basis is generally to low.

(2) Errors in weight. There should be little error in this regard, but the tare of trucks and wagons is often assumed from one weighing and no alteration ever made for wet or muddy weather or lost parts. In a recent case on a famous mine the error in weight due to a dishonest employee was an increase of 40 to 50 tons per day reported on the weight of the ore, amounting to an error of 20 per cent. The most common case of error in weights is on the side of giving good measure.

(3) Losses in handling. These may be, and often are, great. Concentrates shipped to Europe in bulk may shrink 5 per cent. in weight, or concentrates stored in heaps in the open may shrink rapidly, due to the wind. These two losses, however, should be taken into account when one is calculating the actual recovery.

In a mill itself there is a daily accumulation of spills which are often hosed or sluiced through the floor; millmen are generally careful not to allow this material to get into the tailings sampler.

Having briefly reviewed the possible errors, the apparent theoretical recovery and actual recovery in the case taken for illustration appear somewhat as follows: Apparent theoretical recovery, 77.5 per cent.; actual recovery, 67.5; errors in assaying and sampling, 2.5; errors in moisture determination, 1.5; errors in weight, 2; losses in handling, 4. Attention to the details of each of these operations will always serve to reduce the gap between theoretical and actual recovery, and it behooves an engineer to get the gap closed rather than to take the complacent attitude that "the theoretical recovery is always too high."

Mining in the Province of Oriente, Cuba

BY W. T. GREY

Little has been written about the mineral resources of Cuba and as no proper geological survey has ever been made, one of the country's most important resources has been neglected.

In the province of Oriente, about five miles north of the town of Holguin, are a number of gold mines that have been exploited with more or less success since the time of the early Spaniards; some of the old workings would seem to indicate even an earlier date, and it is known that gold was obtained in considerable quantities from the Indians in this part of the island by their Spanish conquerors.

The workings of some of the mines are extensive but shallow, due, no doubt, to water difficulties encountered by these early miners. The fact that rich ore has been found in many of these mines just below the old workings goes to prove the above theory. The country rock is serpentine, which is one of the most ancient rocks of the island and the most productive of metals.

At the present time, with the exception of the Santiago mine which is being worked by the Holguin-Santiago Mine Company, an American company, nothing has been done in this district but prospecting or preliminary work. The ore of the Santiago mine is soft and easily mined, and an average assay of the ore shows it to contain about 2 oz. gold and 0.38 oz. silver per ton.

The strike of the Santiago vein is northeast and southwest and it dips at an angle of 20 deg. from the perpendicular. The value of the ore blocked out at the present time above the 200-ft. level is estimated to be over $600,000 which, when the comparatively small amount of underground development work is taken into consideration, holds out promises of a brilliant future. The small 30-ton amalgamating and concentrating plant that was installed on this property a little less than two years ago, although making a poor extraction, has produced $100,000 in gold.

Adjoining the Santiago mine on the west is the Mejor mine, owned by El Mejor Mining Company, of Scranton, Penn. The development on this mine consists of three 50-ft. shafts, and H. C. Saunders, superintendent, states that his company is planning extensive development work to be carried out in the near future. East of the Santiago mine, little work has been done thus far on the vein, but the one shaft started shows good ore at 60 ft. This mine is owned by the Cuban Gold Mining Company, of Havana, Cuba.

The alluvial deposits of this district are still intact, and are of importance. Generally speaking, this part of the island offers an encouraging field for well directed exploration.

Coal Mining at Morgantown, West Virginia

System of Operation Typical of District. One Unique Feature Is the Aerial Tramway Which Carries Coal over the River to Storage Bins

BY R. B. BRINSMADE*

Morgantown, W. Va., is a city of 12,000 people, and is situated on the right bank of the Monongahela river, 100 miles south of Pittsburg. The city contains the State university and mining college, and lies at an altitude of 900 ft. among the hills of the dissected Cumberland plateau, some 50 miles west of the Allegheny mountains. The Pittsburg coal seam outcrops within the city limits, and is now being worked at the Tait mine, two miles down the river, and at the Fulmer mine, on the Morgantown & Kingwood railroad, a mile to the northeast.

The Tait Mine

The Tait mine is a drift operation opened on the left bank of the Monongahela river, across from the village of Star City. The Pittsburg seam outcrops 200 ft. above the water and 300 ft. below the crest of the plateau at this point. At intervals of 40 and 60 ft., respectively, above the Pittsburg bed, are the Redstone 5-ft. seam and the Sewickley 4-ft. seam, but these are not worked.

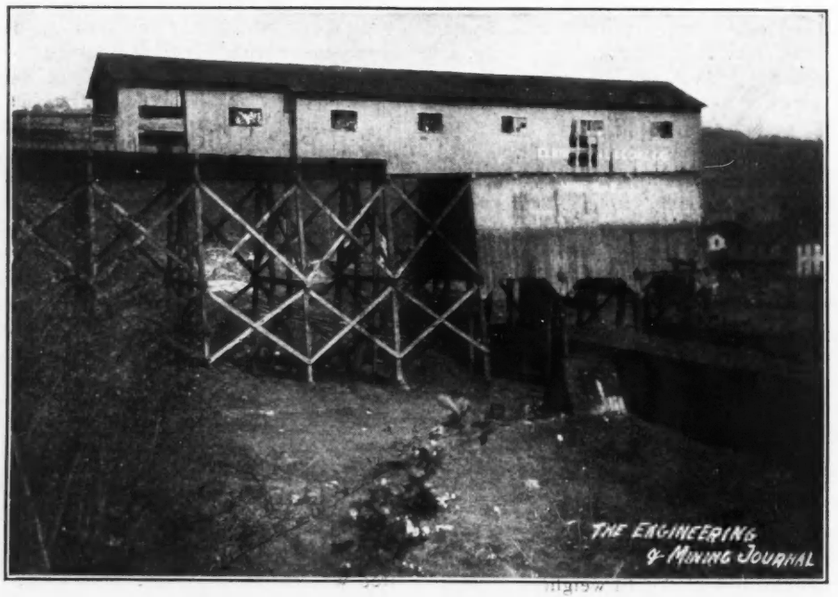
The Pittsburg seam shows 9½ ft. of clean coal with an inch parting, 3½ ft. from its top; the floor is 18 in. of fireclay resting on a thick bed of shale, and is nearly flat. The roof is an 18-in. layer of clod, which is overlaid by a 1-ft. seam of coal. This last seam is left in the mine, as is also about 18 in. of coal at the top of the main seam to prevent the clod from falling.

The mine is laid out on the two-entry room-and-pillar system. The main entries are run on the face at 1200-ft. intervals, and from these the butt entries are turned at right angles on 348-ft. centers, with 30-ft. pillars between the haulway and air course; all entries are 9 ft. wide. The rooms are run on the face and are 15 ft. wide on 40-ft. centers with necks 9 ft. wide. The pillars are robbed on the retreating system and the present development permits an output of 500 tons in 10 hours.

The undercutting is done by hand pick, and for the headings it is 3½ to 5 ft. deep, while the breaking down of the coal is accomplished by two shots of black powder for which holes are bored by a 2-in. breast auger. In the rooms the undercut is made in two benches horizontally, one bench being alternately driven 2 ft. ahead of the other, with the undercut made 4 ft. deep and two shotholes being used for each bench. One miner can undercut, blast and load five to eight of the 3200-lb. wooden cars during one shift. To assist the natural ventilation, 9-ft. crosscuts are driven at 80-ft. intervals along the entries and rooms.

The Haulage System

The cars are hauled from the rooms by horses over a track of two 3x4-in. oak rails. In the main entry the trains are hauled over 16-lb. steel rails by a modified power-plane system to the head terminal of the aërial tramway, or they can be run around the hill on a gravity tram to the bins above the steamboat dock.



Showing General Style of Coal Tipple Common in the Morgantown Field

The aërial tramway carries the coal from the pit mouth over the Monongahela river to storage bins above the tracks of the Baltimore & Ohio railroad on the east bank. It is on the Bleichert system and was built by the Trenton Iron Company. It has only one span, 920 ft. long, with a drop of 116 ft. The carrier rope is locked-coil, 1⅜ in. diameter on the loaded side and ⅞ in. on the other, while the traction rope is 1⅝ in. and of Lang lay. The carrier and traction ropes are kept at constant tension by heavy weights hanging over pulleys at the lower terminal.

The steel tram buckets hold 1360 lb. of coal and are placed 200 ft. apart for the capacity of 50 tons per hour. More or less buckets can, however, be used as all the ropes are under constant tension and the drop of the catenary is all that varies with changing loads. For operation there are three men, one at the bottom to straighten up the self-dumped buckets, and two at the head terminal; one to handle the braking sheave and the other to load the buckets from the coal hopper above, which is filled direct from the mine cars.

The Fulmer Mine

The Fulmer mine now belongs to the Elkins Coal Company and is designated as No. 5. As these workings lie nearer the rim of the Monongahela basin than the Tait mine, the Pittsburg seam is thinner (8 ft.) and shows no additional 1-ft. seam above. The coal rests on a fireclay bottom and it is all taken out up to the layer of draw slate, which underlies the sandstone roof. The coal is clean, except for a 2-in. parting 18 in. from the roof, whose joint planes run parallel to the face cleat of the coal, and this condition requires a careful watching, during undercutting and pillar robbing, to avoid accidents.

This mine has an output of 400 tons daily and is laid out also on the two-entry room-and-pillar system. The entries are 11 ft. wide, with 30-ft. pillars between haulway and air course; the butt entries are placed at 352-ft. centers along the main entry, so that the rooms can be 279 ft. long and have a 30-ft. pillar along

*Consulting mining engineer, Morgantown, W. Va.

their ends. The rooms are at 35-ft. centers and are 22 ft. wide, except for the 25-ft. neck where the width is only 11 feet.

The Coal is Undercut by Electric-chain Machines

In this mine, only the pillars are undercut by hand pick, the headings and rooms being worked by four Jeffreys' electric-chain machines, which make a cut 6½ ft. deep by 3½ ft. wide. A heading takes three and a room takes six cuts for a run. There is little sulphur to bother the chain cutter, which is kept about 6 in. above the floor to avoid the irregularities of the latter. The undercutting of 8 to 10 rooms forms the average day's work for one machine.

Timbering and Blasting

In the entries, there is but little timbering, except at the entrance, but the roof of the rooms is supported by two rows of unbarked hardwood props placed 6 ft. apart, longitudinally, between the track and the inbye rib.

Holes 2 in. diameter and 6 to 7 ft. long are put in by breast augers on an up-slant of 15 deg., just under the roof. A 15-in. paper cartridge of black powder, fired by a squib, is used in each hole, except in wet places, where carbonite is substituted.

The Pillars are Robbed Along a Line of Advancing Trenches

As soon as the first two rooms next the main entry are completed, the pillar between them is attacked at its far end, and, as the succeeding rooms along the butt entry are completed, their pillars are similarly cut out along a line of advancing trenches. The joints in the roof make it drop in blocks, which often extend to the surface a few score feet above, and the robbing thus requires great care in the manipulation.

In the rooms, the rail weight is 16 to 20 lb., in the entries it is 30 lb., and on the surface tram it is 60 lb. per yd.; the gage throughout is 44 in. For inside work, there are two 5-ton and one 3½-ton, and for outside work there is one 10-ton locomotive; all these are of the Jeffrey make, type D.M., class 70, and have class 16 controllers. The inside locomotives are fitted with wire reels so that they can leave the trolley wire of the entries and gather the cars in the rooms.

The outside tramway from the pit mouth to the tipple in the railroad, 1¼ miles distant, has an average grade exceeding 3 per cent. It crosses the county road twice by taking the current from a trailer running along the high-feed wire, the low trolley wire being cut out for the road. The round trip takes one-half hour, down trip being at rate of 10 to 12 miles per hour, and the up trip half as fast.

Ventilation

The fan is a Clifford-Capell exhauster 10 ft. in diameter and 110 r.p.m. It is belted to the countershaft of an electric motor of 60 h.p. and 800 r.p.m. There are four intakes, owing to the fact that several of the main entries run clear through the hill, and this allows the separate splits to be short, saves overcasts and greatly decreases the power necessary for circulating the 65,000 cu.ft. of air per minute which passes the fan. The break-throughs in entries and rooms are 11 ft. wide and placed at 65-ft. intervals. The overcasts and brattices in the entries are concrete; in the rooms they are of boards.

To handle the water which collects in the low places of the floor, a niche is cut in the rib to hold a barrel which can be filled by the trackman with a hand pump and drained through a pipe to one of the central sumps. Two of the sumps are let out by siphons of 2½-in. pipe, several hundred feet long, and three are drained by centrifugal pumps. The latter are Worthington pumps of 8 h.p., belted to Westinghouse electric motors, type E, going 1400 revolutions per minute.

The Tipple Arrangement

To handle the mine output of 400 tons daily, about 150 wooden cars with loose wheels and a capacity of 2½ tons are in use. The trains of 16 cars arrive at the tipple from the mine and are run over a Phillips patent crossover dump, by which they are arithmetically tipped over the screens and returned to the empty track. Only slack and lump coal are separated, the former for sale to cement works and the latter for the rolling mills nearby.

The electric current is supplied by the Union Utilities Company, of Morgantown, at 6600 volts, 3 phases and 60 cycles. It is first stepped down to 160 volts in three Westinghouse transformers, whence it passes to a Westinghouse, 200-r.p.m. rotary converter, where it is changed to a direct current of 250-volt pressure for general use in lighting, haulage and pumping.

Labor

The regular mining force comprises about 80 men; of these, 63 are miners and laborers, eight are trainmen and three are bosses, the rest being carpenters, smiths and electricians. The skilled men are mostly Americans, while the Slavs and Italians are numerous among the unskilled force, who work for a wage of from $1.60 to $2.50 per day. Coal cutting and loading are done on contract, and the mine, like most of those in northern West Virginia, is worked nonunion. There are two 10-hour shifts, though only a few loaders and pumpmen come out on the night shift, as a rule.

Locomotive Haulage on the Overhead Trolley System

Special Correspondence

At the meeting of the North of England Institute of Mining and Mechanical Engineers on April 9, a paper was presented by Henry Moore Hudspeth on "Electricity at the Shamrock Collieries, Herne, Westphalia, Germany."

In the section on haulage, he said that locomotive haulage on the overhead trolley-wire system is adopted; the voltage system being 200 volts direct current, the rails serving as the return. For converting the alternating current to direct current, there are two motor generators, connected up to the low-tension side of 5000-1000-volt static transformers by means of a high-tension lead-covered armored cable for 1000 volts, with oil switches, and fuses on each phase, at both ends. Under ordinary conditions each motor generator sustains eight locomotives in working order. At present, two of the locomotives are standing by in reserve, and consequently one of the motor generators is as a rule standing in reserve. Each has an output of 6.5 kw. at 230 volts and 730 r.p.m., the outgoing trolley wires being charged at this voltage. The generators are compound wound, each being connected up to the direct-current switchboard from which the feeding cables for the line go.

In Case of a Short Circuit

The trolley wires are firmly attached to the roof and insulated therefrom by means of double-shed porcelain insulators, which are fixed at distances apart varying from 16½ to 20½ ft. and have a protective iron covering. In the event of a short-circuit between the trolley wire and the rails, the whole line through the growth of the current operating a blow-out switch is instantly made dead. The necessary lighting is done at the landings, etc., by simply putting 220-volt lamps between the trolley wire and the rail.

Each locomotive is provided with two compound-wound motors having a normal of 11.8 and a maximum of 17.7 h.p. each, so that each locomotive has a normal of 23.6 and a maximum of 35.4 h.p. They are wound for a voltage of 220, and run at 500 r.p.m., driving on to the wheels through 5.33 to 1 gearing. The motors which are entirely inclosed for keeping out the dust, are hung on to the frame by springs.

Mr. Hudspeth says the frame of the locomotives rests through strong springs on to the steel axles, and by means of a drawbar with spring, no jerk is given to the set of cars on starting. The driver's seat being as low as possible is arranged so that the handwheel of the brake can be operated by the right hand, while the

left hand of the driver serves for the operation of the controller. The controller is arranged for series and parallel connections for running the motors either in parallel or in series and is also provided with a reversing switch. A protecting roof is fixed on to the locomotive for the purpose of protecting the driver against the overhead-trolley wire. This forms the highest point of the locomotive, and is at 53 in. above the rail level. The overall length of the locomotive is 128 in., the greatest breadth being 40 in. beyond which no part projects. By normal revolutions of the motors, the speed attained by the locomotives is equivalent to 8 miles per hour.

The Plant will Handle About 2000 Cars Per Shift

At present about 4 miles of haulage road are under electrification, and the plant is built to deal with about 1920 cars of coal in a working time of about 7½ hours, this being equivalent to an approximate output of 2116 tons per day, the average weight of coal per car being about 0.55 ton.

The whole of the electric haulage at the colliery is at the 1870-ft. level; curves of a less radius than 32¾ ft. are avoided and the average gradient of the roads is in favor of the load, amounting to 1 in 450. This small even gradient is good for locomotives, and may in some measure account for this success. There are, however, cases under this company in which the full load is drawn up a gradient of as much as 1 to 80.

Mr. Hudspeth presents a table of costs for the month of March, 1909, representing 26 working days of 16 hours each as follows:

COSTS OF ELECTRIC LOCOMOTIVE HAULAGE AT THE 1870-FT. (570-M.) LEVEL, SHAMROCK 1 AND 2 COLLIERIES.

	Marks.	
(1) Interest on capital at 4 per cent.	500.00	$120.00
(2) For renewal of plant, life taken at 15-year rate, 4 per cent. = 4.993 per cent. on capital	624.13	$150.00
(3) Oil and grease	37.80	$9.07
(4) Waste, etc.	0.73	$0.17
(5) Repairs	849.66	$204.00
(6) Power: 15,725 units at 0.72c.	471.75	$113.00
(7) Wages	3453.80	$829.00
(8) Subscriptions to workmen's funds, etc.	323.49	$77.52
Total cost of haulage	6261.36	$1502.76

The total output of locomotives was 63,308 tons, and the cost per ton was therefore about 2.2 cents.

The Tennessee Coal, Iron and Railroad Company has begun the construction of 280 Koppers by-product coke ovens at Wylam, near Ensley, Ala. With 560 ovens now under construction at Gary, Ind., and 280 built at Joliet, Ill., in 1907, this will give the Steel Corporation 1120 Koppers ovens. The estimated daily output of the Wylam plant, with Alabama coal, is 3150 tons coke, 22,000,000 cu.ft. fuel gas, 35,000 gal. tar and 44 tons sulphate of ammonia.

Electricity in Coal Mines*

By W. M. Thornton

The peculiar feature of the electric current is that, although in bulk and under great pressure enormous power can be transmitted, yet the main current can be subdivided almost indefinitely and still serve a useful purpose. Electric lighting by arcs was first applied to open-air lighting, but with the invention of the incandescent lamp, electric lighting was carried underground. Underground lighting having proved a success, low-voltage motors were installed for haulage and pumping. They had flexibility of control, but the cost of installation was so high, both in cables and in machines, that long-distance transmission to points far underground was almost prohibitive. The introduction of the 240-volt incandescent lamp, and the three-wire system of distribution for house lighting, led to the 480-volt motor. The great reduction in the cost of cables and machines for a given power consequent on this, was followed at once by an increase in the use of electricity underground, which has been maintained at an increasing rate up to the present time.

Adoption of Higher Pressures and Alternating Current

The introduction of 500-volt motors underground, however, had some disadvantages. These motors sparked considerable when they had to carry severe overloads. Shocks which at 100 volts were rarely dangerous, at 500 volts became deadly in the humid condition of the air and skin. Lastly, the arc at the break of a cable at the higher voltage was more prolonged and its igniting power greater. These dangers, although they have been lessened, have still to be conquered. For sparking alone, the introduction of three-phase motors is an undoubted gain. They are not so readily controlled in speed as continuous-current motors, and they require almost as much attention, but they do not spark, and their switch gear can be inclosed in oil.

With regard to shock, anything over 400 volts seems to have the power of paralyzing muscular movement, although men differ remarkably in this. A shock taken through the palm of the hand is much more severely felt than through the fingers. Everything considered, there is not much difference between direct or alternating voltage as regards shocks at moderate pressures. In modern practice, with high-tension alternating systems, the risk of shock is not increased in proportion to the voltage, for in the first place greater precautions are taken to inclose and protect live parts, and the knowledge that contact is possibly fatal is more in the minds of the workmen.

Of all of the forces of nature which have to be met in working coal, gravitation is the most dangerous. Of the fatalities occurring in Great Britain in the years 1903-1908, 99.17 per cent. had nothing to do with electricity. With regard to the ignition of gas there is only one word to be said—that since a spark from a hand generator is sufficient to ignite it, when gas is present, electricity should be absent or entirely inclosed.

Electricity and Coal Dust

With regard to coal dust, it is only within the last 20 years that this has been seriously considered as an explosive. It has been proved that coal dust can be ignited by bare flame, like gas, requiring, however, longer contact at the start, and it is this question of time of contact and volume of flash which until recently had not been worked out. The temperature to start a local ignition was found to be 140 deg. C., pointing to the ignition of gases released from the coal rather than to decomposition of the coal by oxidization. This temperature is fortunately beyond anything met with in ordinary electrical engineering practice, except, of course, in arc lamps; however, in the case of an incandescent lamp resting on coal dust ignition took place freely. A local ignition, but not an explosion, of coal dust has been known to have been produced by a stream of iron sparks from a belt.

A series of experiments were carried on to determine what electrical current at any given voltage would, when broken quickly as by a switch, or slowly as by a cable parting, or through the blowing of a fuse, ignite dust collected from the walls and timbers. These experiments were conducted for both direct and alternating current. It was found, that with direct non-inductive circuits, the least current causing ignition at 100, 250, 500 and 600 volts, were respectively 70, 11, 5.9 and 4.8 amp. With the same alternating voltages they were 120, 36, 11.8 and 7.5 amp. A point of interest which was obtained from the result is that it is not the energy of the flash which controls the percentage of risk, but its volume and duration. The energy is proportional to the square of the current flowing. In every case the increase in ignition was directly proportional to the increase of the current.

So far, then, as danger from the quick break of a circuit in a cloud of dust is concerned, alternating current is, at the usual voltage of 500, twice as safe as direct, and at 250 volts much more. At 100 volts the ratio of safety is the same as at 500, because at the lower voltages volume of current is the dominating factor, and at the higher, duration of arc.

The difference between the two is even more marked in the blowing of a fuse.

*Abstract of article published in *Colliery Guardian*, May 6, 1910.

The percentage of ignition is more than four times greater with direct than with alternating current under the same conditions, at a voltage of 100.

Mechancal Improvements

Whatever the degree of danger may be, it is much lessened by the use of switch and distribution boxes with wide flanges. It is certainly true that the general adoption of the metal-to-metal wide flange wherever possible would do more to inspire confidence among men handling the apparatus than almost any other immediate reform—excepting perhaps the adoption of low-voltage distribution.

The essential feature in the use of alternating current is its power of safe and efficient transformation from high to low voltage. Apart from the question of cost, the combination of a transformer and motor is in every way safer, at least underground, than a motor wound for high tension supply. It is unlikely that direct pressures above 1000 will ever be used underground on account of the difficulty of maintaining sound insulation. If then electrical energy is to be used for all purposes in collieries, and economical transmission is essential, it is difficult to see how direct current can compete with alternating for large collieries or group of collieries.

The Protection of Cables

Perhaps the most vexing question at the present time is whether or not cables should be armored. The two dangers in underground cable work are shock and arc. With armoring, the latter can be entirely removed, but the risk of shock remains where contact with, say trailing cables, is possible. Where there is likelihood of contact and shock, which is for all practical purposes only on trailing cables, unarmored cables served with small ropes have been found satisfactory. The coal-cutter motor frame is earthed through a pilot on to the armoring beyond the gateway end switch.

No colliery manager should be expected to decide matters of policy or detail in his electrical plant unless he is himself a competent elecrtician. It follows that if the executive electrician is also to be "competent," he must have had a recognized training and should have passed some qualifying test. This would not weed out the habitually careless, but it would enable responsibility to be fixed.

The only barite mine in California is in Mariposa county, a few miles below El Portal, on the Merced river. An incline tramway has been built, with bunkers, and the ore will be shipped to the Leona Chemical Company, Oakland, where it will be used for paint. The Chemical company and the mine are owned chiefly by F. M. Smith.

The Dan River Coalfield in North Carolina

The United States Geological Survey has recently made an examination of the Dan River district, in Stokes and Rockingham counties, North Carolina, to determine whether or not it contains any important coal beds. The work was done in March and April by R. W. Stone, geologist, who has been investigating coal lands for the Government for the last eight years. Mr. Stone examined all the known prospect pits and had a number of them reopened.

Mostly Black Shale

The coal-bearing rocks consist of a narrow belt of black slaty shales which extends from a point just north of the Virginia line southwestward through Leaksville, Madison, and Walnut Cove to Germanton, N. C. Some people in the district believe that these black shales, which they regard as a "sign of coal," are thicker where they lie under cover and that if they are followed far enough down they will be found to be coal. This idea has no foundation in fact but has been the incentive to much useless labor and unwarrantable expense. At a few places on Dan river in the black-shale belt, thin beds of a hard semi-anthracite have been found. This coal disintegrates very slowly and consequently should be as thick at the surface as it is underground. It varies in thickness, however, from place to place and is as likely to be thinner at considerable depth as it is to be thicker. Scarcely more than a foot of good coal has been found in any one bed in the district in a distance of 30 miles along the outcrop, a fact which further diminishes the probability of finding thicker beds below the surface.

The black shale is well exposed at the bridge over Dan river half a mile below Leaksville, in the streets of Madison, and in the railroad cut on the county line at the mouth of Carter creek, but in none of these places does it show any sign of coal. The beds dip to the northwest at angles ranging from 20 to 60 deg., so that a prospect becomes a slope, and in this district all slopes have to contend with a large amount of water.

Only a Little Good Coal

During the Civil war coal was mined on the Wade plantation, 3 miles above Leaksville, and shipped by boat to Danville. Although the coal is semi-anthracite, the bed is so broken up by shale partings and so small in extent that operations were soon discontinued. Subsequent prospecting on either side of the old pits shows that the bed is a small lens and carries only a few inches of coal.

More than 50 pits have been dug within 3 miles of Walnut Cove in search of coal. Some of these diggings represent several weeks' work and the expenditure of a considerable sum of money. High-grade coal has been found, but it is nowhere more than a few inches thick.

Black Shale Resembling Coal

A bed of what appears to be soft, flaky coal has been found at several places in the vicinity of Walnut Grove. This material is bright black and looks like some form of coal, but it is probably only a coaly shale. Its soft and flaky character seems to be due to crushing that has produced widespread effects in this region, and it will probably be found in the same soft condition even where it lies at considerable depth. As this coaly shale is of the same character for several miles along the outcrop there is no reason to suppose that it changes to coal down the dip of the beds, where it is under greater cover. Mr. Stone sunk a pit half a mile south of Walnut Cove and found that this bed is at that point more than 10 ft. thick. Analysis shows that it contains a high percentage of ash, and thorough tests prove that it will not burn, and therefore has no fuel value.

"Soft Coal Vein" Contains No Coal

Halfway between Walnut Cove and Germantown several large pits have been dug and some coal has been recovered from a bed of semi-anthracite less than a foot thick. This coal rests on coaly shale which is so bright and black that it has been mistaken for coal and which is known at Walnut Cove as the "soft coal vein." It is not coal, however, and there is no reason to believe that it has been changed to coal even where it lies at great depths. As this is by far the thickest and most conspicuous bed resembling coal that has been found in the district, the statement that it is not coal will doubtless be disappointing to those who have been counting on it as a future source of wealth.

No Valuable Coal Beds in Dan River Region

Mr. Stone's conclusion is that there is no reason to expect to find commercially valuable coal beds in the Dan river district. The beds of semi-anthracite found there are only local; they are of small lateral extent and only a few inches thick. It is, therefore, useless to expend money and energy in this region with the hope of developing a coal mine. Anyone desiring to study the character of the beds near Walnut Cove would do well to visit them now, while the excavations made by Mr. Stone are still fresh.

The general strike of the coal miners in New South Wales reduced the coal production of that State from 6,520,749 tons in 1908, to 4,393,603 tons in 1909; a loss of 2,127,146 tons, or 32.6 per cent.

Treatment of Mine Ponies

BY A. H. STOKES*

An article dealing with the treatment of mine ponies, published in the January issue of *The Humane Review*, gives a gloomy view of the underground surroundings and cruelty to pit ponies—so much so that the life of the animal appears to be one of inhuman treatment, and cases of revolting cruelty are described as having occurred underground. I believe the statement to be exaggerated and wanting in important details. I regret to say that cases of cruelty do sometimes occur, and that occasionally, through ignorance or carelessness, the ponies are neglected and badly treated; however, it is only fair that the public should be made acquainted with the precautionary measures, both statutory and otherwise, which are available for the protection of pit ponies and for the detection and punishment of those responsible for cruelty or inhuman treatment.

The article published in the *Review* is quite dramatic, and most sensational. The first paragraph of the article concludes as follows: "Beyond all who mutely suffer, unconsidered, unprotected, in submerged and nameless horror, encompassed in miasmal oblivion, stands the pit pony."

As a general rule, the stables underground are whitewashed frequently, well ventilated and cleaned daily. It is also a fact that these stables compare favorably with stables on the surface. Although all districts throughout Great Britain do not have uniform laws, the following special rules, which apply to a number of districts, are typical of the general rules prevailing throughout the entire country:

(a) "Every horsekeeper shall see that no animal under his care is allowed to work while in an unfit state, and shall report to the manager, undermanager, or deputy, any injury received by any animal."

(b) "Every person in charge of any animal shall report immediately to the horsekeeper, or deputy, any injury received by such animal while in his charge."

(c) "Every person in charge of any animal shall report to the manager, undermanager, or deputy, in case he finds that such animal cannot pass along any road without rubbing against the roof or timbering."

(d) "Every horse driver shall carefully convey his cars and use sprags, lockers, or other means of scotching the cars, when necessary."

Other districts have the following rule: "Every person who shall observe or become aware of any breach of discipline, or of the Act or special rules, shall, as soon as possible, report such breach to the manager, undermanager, enginewright or deputy."

The author of the *Review* article cites more than a dozen complants covering practically every phase relating to the treatment of pit ponies. He condemns the present method of lowering the ponies down a shaft, and states that the ponies are not only neglected and cruelly treated, but are overworked and underfed. Such complaints would lead a reader to suppose that brutality was systematic, and neglect, the lot of the pit pony when once down below. Any visitor to the stables in a mine may occasionally find a pony suffering from serious injury, accidentally received in the mine, but let the same visitor, when he returns to the surface, make his way to the nearest hospital and, if in a large colliery district, he could possibly find a poor man or boy, one or more, lying seriously injured and suffering from accidental injury received in the mine. It may even be that the pony in the mine and the driver in the hospital bed received their injuries from the same fall of roof.

Mining operations always have been and always will be dangerous, and there are few mining men who live to threescore years but who have either been more or less seriously injured, or have had a narrow escape from being killed.

Inspectors and Prosecution

It is true that no mine inspector can periodically examine every pony when at work in a mine, any more than can the inspectors of humane societies and policemen see every horse at work on the surface. However, all the pit ponies can be seen in the stables if the inspector has cause to suspect that cruelty and neglect have prevailed. In all large and well managed mines, a veterinary surgeon periodically examines the horses in the mine and makes a report upon their condition. This is better than an inspector of mines examination.

The writer of the article in the *Review* has suggested eight rules for compulsory observance. Although there is nothing suggested that will be of material assistance to those responsible for the care of ponies. I will cite the rules in the order given:

No. 1. "The numbering of every animal on descending the shaft." A man's children are named, not numbered, equally so every pony in a mine is named, and if not named before its descent, it soon will be by the driver. I have never yet met a pony in a mine without a name. The name, in my opinion, is far better than number.

No. 2. "No pony to be engaged under or over a certain age." As the minimum and maximum ages are not stated, it is unnecessary to remark further than to say that ponies should not go down under four years old, but five years is preferable.

No. 3. "Limitation of hours of ponies' work." In some mines a register of the shifts is kept. It is a matter difficult to deal with, for in pits of moderate size spare horses are not kept, and if one falls lame or injured, it becomes necessary at times to work some of the others overtime.

No. 4. "A meal half way between the allotted hours of work." In the present arrangement of eight hours' work at mines there are only about fifteen minutes for either men, boys or ponies to get food. To take the ponies back to the stables for a meal, or even for half an hour's rest, would be impracticable with the present limitation of the hours of labor.

No. 5. "Supply of water for every animal engaged." In most mines there is a supply of water taken into the workings for the ponies, but there are cases where the pony would be the eight hours without water.

No. 6. "Every driver to be licensed and registered, and time in charge booked." I think this unnecessary, for the driver of any pony on any day can soon be known if required. The youths are appointed drivers, and their names registered in the time-books.

No. 7. "Every injury to a pony to be reported, investigated and registered." I presume "every injury" must be taken to mean serious injury; if so, the special rules and regulations of most mines already provide for this.

No. 8. "Periodic examination of all animals by veterinary surgeons invested with plenary powers." I have already stated that in many mines there is a periodical examination, and there is an adequacy of plenary power at command if required.

The suggestions in my opinion show a regrettable want of knowledge of the precautionary measures taken to secure the humane treatment of pit ponies.

Note—Abstract of article appearing in "Colliery Guardian," April 15, 1910.

*Formerly chief inspector of mines for Midland district in England.

PERSONAL

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

Albert Howe Carpenter is visiting New York.

E. P. Mathewson, of Anaconda, was in New York last week.

John D. Ryan will return to New York soon, and will leave at once for Europe.

W. M. Brewer, of Victoria, B. C., recently went to Ketchikan district, Alaska.

D. D. Mann, of the Canadian Northern Railway, has gone on a trip to the Pacific coast.

Louis A. Wright, consulting engineer for the General Development Company, is in New York.

J. W. Hutchinson, general superintendent of the Goldfield Consolidated mines, is in New York.

Allen H. Rogers has left New York for New Mexico and Arizona, to be gone about four weeks.

E. L. Dufourcq has returned from his extensive trip on professional business through the West.

S. F. Bretherton has returned to San Francisco after examining mines in Plumas county, California.

J. B. Tyrrell, Toronto, has gone on a tour of inspection to the north shore of the St. Lawrence, in Quebec.

Hugh G. Elwes has been appointed manager for J. F. Hill, of Chicago, at Papantla, Vera Cruz, Mexico.

W. H. Seagraves, for several years manager of the Veteran mine, left Ely, Nev., recently for Valdez, Alaska.

Robert Hawxhurst, Jr., has removed his office from 62 London Wall to 623 Salisbury House, London, E. C., England.

R. E. Harris, president of the Nova Scotia Steel and Coal Company, and Thomas Cantley, general manager, are in Toronto.

Carl F. Dietz and Dyke V. Keedy, of the firm of Dietz & Keedy, of Boston, have gone to Nova Scotia on professional business.

Francis L. Robbins, formerly president of the Pittsburg Coal Company, has been spending some time in the coal regions of Alabama.

A. Piatt Andrew, the present director of the Mint, has been selected as assistant-secretary of the Treasury, to succeed Charles D. Norton.

A. D. Geiger has sold out his interest in the cyanide plant of the Cortez Metals Recovery Company at Cordez, Nev., and has returned to Boston.

J. W. Turnbull has been looking over coal properties in Nicola Valley district, B. C., for the Consolidated Mining and Smelting Company of Canada.

John G. Worth, who has been situated at Reno, Nev., has removed to New York, where he has opened an office as mining engineer, at 27 William street.

R. H. Morris, of Mexico, has been commissioned to examine coal lands in Similkameen district, B. C., for prospective buyers resident in Spokane.

G. H. Carnahan, in charge of the mining department of the Compañia Metalurgica Mexicana, has recently been in Denver, and is now in New York.

E. A. Julian, formerly assistant mill superintendent at the Goldfield Consolidated, is now in charge of operations of the Picacho Basin Mining Company, near Yuma, Arizona.

Dr. Benzo Katsura, professor of metallurgy in the Tokio Imperial University, who has been making a tour of the metallurgical districts of the United States, has returned to Japan.

Dr. J. Bonsall Porter will shortly return to Montreal from a trip through western Canada with the McGill summer mining school. A little later he will proceed to Europe on a visit.

Hiram W. Hixon has completed the course of lectures he has been delivering at the University of Pennsylvania, and will reside for the summer at 509 Seventeenth street, Ocean City, N. J.

R. L. Bartlett, recent graduate of the course of mining geology at the Massachusetts Institute of Technology, has accepted a position with Frederick G. Clapp, geological engineer, Pittsburg, Penn.

Dr. Eugene A. Smith, for many years State geologist of Alabama, was presented with a silver loving cup by the alumni of the University of Alabama at the recent commencement of that institution.

W. R. Fairley, of Birmingham, Ala., for several years member from Alabama of the national executive board of the United Mine Workers of America, has been appointed immigration inspector at the port of New Orleans.

F. T. Rubidge has resigned his position with the New Jersey Zinc Company, at Franklin Furnace, N. J., and is now with Ladenburg, Thalmann & Co., New York. His personal address is 117 Park street, Montclair, N. J.

Guy R. Johnston, of Birmingham, Ala., until recently vice-president and general manager of the Alabama Consolidated Coal and Iron Company, is opening an office as consulting and contracting engineer in the Brown-Marx building, Birmingham, Ala.

OBITUARY

William H. Austin, formerly of Boston, died in the City of Mexico, May 24, aged 45 years. He had had an office as consulting mining engineer in Mexico for several years past.

Percy Lincoln Baldwin, a mining engineer for some time past at El Oro, Mexico, died at the American hospital in the City of Mexico, May 25. He was 35 years old.

Ely C. Woods, a graduate of the Michigan College of Mines and for some time past with El Rayo Mining Company at Santa Barbara, Mexico, was killed, May 28, by a fall of ore in the mine.

John Deguee died in Brooklyn, N. Y., June 2, aged 74 years. He was born in Germany and educated as a mining engineer. He was connected with the Calumet & Hecla Company for many years, retiring from active work several years ago.

Edmund H. McCullough died at Philadelphia, May 31, aged 61 years. He had been a coal operator in the Irwin field in Pennsylvania for many years, and for 20 years was president of the Penn Gas Coal Company and the Westmoreland Coal Company, the most important concerns in that district.

SOCIETIES and TECHNICAL SCHOOLS

Wisconsin State Mining Trade School—The first commencement occurs at Platteville, Wis., on the evening of June 10. Hon. J. W. Murphy will deliver the commencement address.

Sherbrooke Mining Institute—At a meeting held at Sherbrooke, P. Q., May 21, the following officers were elected: Chairman, Col. J. J. Penhale; secretary, W. H. Smith; executive committee, T. H. Crabtree, L. N. Adsit, J. Greenshields and J. R. Pierson.

Canadian Mining Institute—The eighth general meeting of the Western Branch was held at Grand Forks, May 26. W. Fleet Robertson, of Victoria, B. C., provincial mineralogist, who is this year's chairman, presided; and E. Jacobs, branch secretary, was also in attendance. Several papers were read, as follows: By O. E. LeRoy, on "The Geology of the Ores of Phoenix Camp, B. C."; by L. Reinecke, on "Silver and Gold Deposits on the West Fork of Kettle River"; by Chas. Camsell, on "The Mineral Resources of a Part of Yale District, B. C."

Among those present were Dr. J. Bonsall Porter, professor of mining engineering at McGill university, Montreal, Quebec, who was in the Boundary district at the time with his summer mining-school students; Frederic Keffer, mining engineer for the British Columbia Copper Company; O. B. Smith Jr., mine superintendent, and W. A. Williams, smeltery superintendent, for the Granby Consolidated. The mayor of Grand Forks and Martin Burrell, district representative in the Dominion House of Commons, welcomed the visitors. The next meeting will be held at Kaslo.

EDITORIAL CORRESPONDENCE

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

San Francisco

June 4—Black-sand mining has become active again on the ocean beach of Monterey bay, between Aptos and Port Rodgers. Near San Andreas, 16 claims have been staked out along the bluffs which face the beach. The plants are about alike and consist of several canvas-lined sluice boxes into which the black sand is delivered through hoppers. A gasolene engine is used to pump water for sluicing. A sump hole is dug in the beach for water supply and an old-fashioned China pump delivers the water to the sluices. These beach claims do not pay every year, but must be let lie "fallow" for two or three years to permit the storms to concentrate the auriferous sands of the ocean beach.

At the last meeting of the Anti-Débris Association, a communication was received from Butte county stating that dredgers were depositing tailings in Honcut creek, which finally reaches the Feather river, and that damage was being done. The committee on dredge mining of the Association was given full power to take such steps as thought necessary, and the attorneys of the Association were instructed to commence any proceedings requested. It is evident that dredging operations in different counties are being pretty closely watched by the Anti-Débris Association.

The Beer Gold Mill and Extraction Company has been incorporated with a capital of $100,000, to erect a custom mill at Sacramento.

Denver

June 6—For some years past there has been a good deal written and talked about the copper deposits of Red Gorge and Yarmony, along the line of the Moffat road, just below the mouth of Gore cañon. Several companies were organized, and more or less deceptive prospectuses issued, and a good deal of stock sold. After a fitful existence, during which the promoters failed to make good their promises, all of the operations have ceased without discovery of pay ore. For 15 miles in this district, the Grand river flows in a half circle, as it were, around the base of Yarmony peak, and the track of the Moffat road follows the river. Just above the track in various places the Weber grits have been impregnated with azurite and malachite, and this stratum of beautiful blue and green colored sandstone has been made the basis for the flotation of these companies. Altogether, about eight carloads have been shipped to Denver, none of which carried sufficient to pay the freight. The average yield of the impregnated strata, which vary from 1 to 3 ft. in width, is about 2 per cent. copper, and it might be selected to run 7 per cent. One claim only is now being worked by individuals. It is like the rest: a bedded deposit, and dips about six degrees from the horizontal. A contract for 100 ft. of sinking has been let, and the incline is down 100 ft. The expectation is to run into sulphides, in which case the ore could be concentrated. The Silurian limestone shows under the Weber grits in places 100 ft. thick. Yarmony peak is basalt. This volcanic outburst is probably responsible for the thermal waters which have painted the rocks with the bright colors of the "carbonate of hope" and "oxide of expectation."

On May 27, about 450 men at the Globe plant of the American Smelting and Refining Company struck for an increase of 30c. per day in wages. A committee met with General Manager Guiterman, who told them that such an advance was out of the question with smelteries running at half capacity, owing to the lack of ore supply, but he offered to submit to the board of directors of the company a recommendation to restore the scale of wages in effect prior to the fall of 1907. The men are now conferring over this proposal, and it is likely the matter will be settled in this way. The strike has been perfectly orderly and quiet.

Butte

June 5—At the recent special meeting of stockholders of the Alice Gold and Silver Mining Company held at Salt Lake, a protest was entered by the minority stockholders against the sale of all the company's property to the Anaconda Copper Mining Company, but the sale was nevertheless carried by the majority. The protest is made upon two grounds; first, that the company has no power to make transfer over the objection of any stockholder, and second, that the 30,000 shares of Anaconda stock is not adequate consideration for the transfer. Referring to the inadequacy of consideration, the protest says: "The consideration is wholly inadequate and out of proportion to the value of the group of properties belonging to the Alice company, and the properties of the Anaconda company. The number of shares of the Alice Gold and Silver Mining Company is 400,000 and of the Anaconda company, 4,200,000 shares. The ores disclosed in the workings of the Alice company at this particular time probably show as great or greater obtainable values than at any time in its history. It is well known that there are enormous bodies of zinc ore above the water, that is, above the 700-ft. level, which, as shown by a number of carloads recently extracted for test, contained 17 per cent zinc, 5 to 10 per cent. lead, about 10 oz. silver, and from $2 to $3 gold, and a much greater tonnage of ores of like character below the 700-ft. level to the lowest workings, 1500-ft. deep, carefully estimated in the aggregate at more than 2,000,000 tons." The protest ends with the suggestion that a $500,000 bond issue be authorized to build a mill for the treatment of the company ores, which it is claimed would be more profitable than making the proposed sale.

The stockholders of the Parrot Silver and Copper Mining Company, who voted against the sale of the property to the Anaconda company, have instituted action in the local district court to have the valuation of their shares determined and that amount paid to them by the company. The petitioners are Louis Foss, 200 shares; B. Herber Richardson, 1125 shares; William E. Wall, 1000 shares; Mary G. Knight, 225 shares; Henry B. Jackson, 800 shares; and Isaac Bradford, 150 shares.

The assurance of a railway through the district has caused the Silver Camp district in Cascade county to take on a new lease of life. Patsy Clark and others have taken an option on the Mike Horse company properties. It is planned to put a concentrator on the property. At the Anaconda mine of the Dick Kruger company, exploration work with diamond drills is being pushed. Wells & Murphy are working the Montgomery group which carries gold, silver and lead. With another 30 ft. the tunnel will cut the orebodies from the upper workings. The Midnight Copper Company has driven the lower tunnel on its property about 600 ft., and should tap the orebodies in another 100 ft. When this has been done a concentrator will be erected.

John D. Ryan, writing to the Butte Business Men's Association, says: "The mines of Butte are better developed, more economically worked, and considering the returns from the sale of the metal, more profitable than they have been at any time in the history of the district. The purchase of other companies by Anaconda will insure stability, permanence and economical operation

and will mean extension of operations and the steady employment of labor. The price of copper is low at present, but consumption the world over is greater than ever before and there is demand for all that is being produced. The average cost of copper in Butte is low enough to enable the district to maintain its position as the leading copper-producing district of the world. I can say that mining operations will increase rather than diminish during many years to come."

The Gilmore & Pittsburg railway, concerning which there has been considerable mystery, has recently filed with the secretary of state its resolution of directors stating that the intention is to build from Salmon City, Idaho, to Armstead, Mont., then to Dillon, Mont., and from there to Butte. The fact that considerable work is being done on the Great Northern between Great Falls and Butte in the way of improving the roadbed and track, gives rise to the rumor that James J. Hill is behind the Gilmore & Pittsburg and that he is constructing a new north and south line which will run into San Francisco.

The Government land office has finally decided the contest which the Government instituted against the British-Butte company application for patent to placer claims west of Butte. The company was successful on every point and will obtain patent. This marks the end of a long drawn out contest between the local Government land officials and the company. When the company first applied for patent the local officials took the position that the requisite amount of work had not been done on the claims, refusing to allow the 600-ft. shaft on the property to apply as work toward a placer patent. Government experts were then sent to examine the ground and they decided that the ground was chiefly valuable for quartz and not placer mining, so they objected upon that ground also. Considerable feeling has been aroused against the local officials because of the position which they have taken toward this and other applications for patent to mining land in the vicinity of Rocker, five miles west of Butte. If an application be sought for placer patent, the officials seem invariably to consider the ground as quartz and *vice versa*.

Salt Lake City

June 5—The Utah Mines Coalition Company filed suit in the district court, May 27, against the City Rocks Mining Company, to recover damages of $1,500,000 for ore alleged to have been wrongfully taken from the plaintiff's property between Big and Little Cottonwood cañons by the defendant company. It is alleged that the City Rocks company has trespassed upon the Black Bess, Oregon, Oregon No. 2, Stanley and Butte mining claims owned by the Utah Coalition company, and has taken ore from that property, valued at $500,000. Treble damages are asked for the taking of the ore, and the court has also been asked to issue an order permitting the plaintiff company to make a survey of the underground workings of the City Rocks property.

By the order of the Secretary of the Interior, 8620 acres of land along the Price river have been withdrawn from entry for power-site purposes. Approximately 24,152 acres of land on the Sevier river have been restored to entry. These lands were included in temporary power-site withdrawal No. 103, and are situated in Juab, Millard and Sanpete counties.

During the week of June 2, a large tonnage has been handled from the camp of Bingham. On May 23 the Denver & Rio Grande Railroad moved 217 cars of ore for the Utah Copper Company in ten hours. From May 23, 7 a.m. to May 24, 7 a.m., 378 cars of ore were loaded and sent out by the Utah Copper, and in addition 24 cars of ore from the United States Mining Company and the Utah Consolidated company, making a total of 402 cars for 24 hours. Taking each car as 55 tons, this would make over 22,000 tons of ore sent out of Bingham in one day. The tonnage was handled over the single line of the Denver & Rio Grande.

Goldfield

June 4—At the meeting of the directors of the Goldfield Consolidated, May 26, the usual quarterly dividend of 30c. per share and a special dividend of 20c. were declared. The disbursement will be made July 31, to stockholders of record June 30, and will amount to $1,779,549. When this dividend is paid the Consolidated will have paid in dividends in 1910 $5,338,647, of which $3,559,098 were posted in 1910, the first dividend of $1,779,549 having been declared in December, 1909. At the meeting were president George Wingfield, A. H. Howe, of Goldfield, J. H. Carstairs, of Philadelphia, and J. D. Hubbard, of Chicago.

Word has been received from C. R. Zabriskie, connected with the "Borax" Smith enterprises, to the effect that he has floated the $5,000,000 bond issue required for the construction of the railroad from Goldfield to Ely, and that construction will start this summer. The road will go through rich mining country where there are low-grade gold, silver and lead mines, which, with transportation facilities will be able to ship. It is understood that the road will connect with the Western Pacific near Shafter, Utah, and with the Tonopah & Tidewater at Cuprite, 14 miles south of Goldfield. This would give the Western Pacific a transcontinental line direct to Los Angeles.

A deal will be consummated soon by which Philadelphia men will take over 12 claims in the Cirac mining district, 40 miles north of Tonopah. Three years ago several hundred tons of high-grade ore were shipped from the camp and the purchasers expect systematic development to produce results.

Deadwood, S. Dak.

June 5—The Homestake company continues to operate its mine and mills successfully with exclusively non-union labor. The entire plant has now been run at full capacity for over three months, during which time three of the usual 50-c. monthly dividends were paid.

In spite of the defeat of the union in its attempt to force the closed-shop principle upon the Black Hills, resulting in the exclusion of union labor from this district, the local organ continues to publish misstatements, evidently for the consumption of such outside unions as are contributing to its funds. Agents have attempted to dissuade miners in other fields from coming to the Black Hills. Their want of success is evident from the number of new men already here, and the number continuing to arrive from Michigan, Colorado, and the Missouri-Kansas field, a large proportion bringing their families. Some of the more absurd reports circulated were to the effect that the mills were run at a drop much smaller than the normal one, or that only a fraction of the stamps were dropping, and that the ore-trains were made up largely of empty cars, to correspond with the limited amount of ore which the imported non-unionists were able to break and shovel as compared with the men formerly employed, and that the dismembered bodies of men killed in unmentioned accidents were conveyed in sacks at night to the cemeteries.

The firm stand taken by the city judges in punishing breaches of the peace, the employment at the inception of trouble of a sufficient number of armed guards to protect Homestake property, and the instalment of a searchlight at the Ellison hoist, have combined to make the situation at Lead a comparatively peaceful one. There have, however, been several instances of individual employees being set upon and beaten by union men. The placing of dynamite in the chuck of a drill, and the nailing down of a signal cord in the mine, are evidence that the union has had some spies in the mine, as was openly boasted.

On May 24 an explosion of about 1400 lb. of dynamite occurred in the magazine of the Sunnyside mine near Terry, belonging to the Mogul company. Circumstances indicate that this was the work of union sympathizers. This impression is confirmed by recent attempts to set fire to the Homestake cyanide plant at Blacktail, by throwing bottles containing phosphorus.

The great majority of the employees are now English speaking. This applies

to those who have renounced the union as well as to the new-comers, as few Italians or Slavonians have signed the company card, most of them being deterred through intimidation. The Finns and Scandinavians are divided. The number of union men holding out in the camp is now much diminished, as many left Lead immediately after the spring elections, at which they had hoped to capture the offices of mayor and judge.

A local paper recently published a statement that the Homestake company was about to increase its present mill capacity, already including 1000 stamps, by the addition of 400 stamps and a corresponding enlargement of the slime plant at Deadwood. This is denied by the management. A small addition to the slime plant has been under way for several months.

At Cyanide Plant No. 1 at Lead, steam power has now been entirely replaced by electricity, which is next to be extended to Plant No. 2 at Blacktail. Current is purchased from the Consolidated Light and Power Company. Work is proceeding steadily at the Homestake hydroelectric plant on Spearfish creek, and was contained without interruption throughout the labor troubles.

Birmingham, Ala.

June 6—The American Steel and Wire Company has let the contracts for the concrete work and superstructure for the plant to be erected near Ensley, and by June, 1911, it is expected that the plant will be in operation. Tracks have been laid to the site.

The Southern Iron and Steel Company expects to have all of the machinery at its new steel rod, wire and nail mills at Alabama City, in operation before another month. Already there is a satisfactory output of wire fencing, rod, wire and nails, and a strong demand is being met for the products.

The Alabama Fuel and Iron Company has increased its capital from $2,500,000 to $3,500,000 and has purchased extensive iron-ore properties, taking over the properties of the Russellville Iron Ore and Metal Company. The company heretofore has been in the coal-mining business. Recent developments indicate that iron making will be added.

The North Birmingham Turnbuckle and Drop Forge Company, which recently started up a plant at North Birmingham, announces that its make for two months has been sold ahead. The plant may be enlarged.

The coming into Birmingham on its own rails, of the Atlanta, Birmingham & Atlanta railroad, the new line from Birmingham to Brunswick, Ga., 500 miles, means much for the industrial section of Alabama. The railroad company is interested in the Birmingham Coal and Iron Company.

Scranton, Penn.

June 8—The miners who are on strike at the Pennsylvania Coal Company collieries will return to work during the week; the officials of the company, the members of the Conciliation Board and the officers of the United Mine Workers acting in coöperation brought the men on strike to a realization of their false position. President McEnaney, of the miners' union, has declared that if the men do not return to work under the provisional arrangements which the company is offering to them spontaneously, that the union will leave them to their own resources. On the other hand, Captain W. A. May, general manager of the company; W. W. Inglis, general superintendent, and President W. W. Connell, of the Conciliation Board, declare that as soon as the men return to work a special meeting of the board will be called to examine and settle grievances as quickly as possible.

The majority of the miners employed by the company are foreigners, most of them Italians, the most intractable of the nationalities employed in the anthracite mines. They cannot be brought to understand that the award of the Anthracite Commission applies to union and nonunion men alike. President McEnaney's declaration had a sobering effect on the men's attitude toward the company, and they finally agreed to leave the settlement to the Conciliation Board.

During the course of the strike there have been a few outrages perpetrated by the strikers, but they were not serious in their results.

Cobalt

June 2—An important discovery of native silver on the Devine properties at Maple mountain has drawn attention to this district. This section has never been visited by a boom, but operations are being carried on in a systematic manner, and during the last few months several good finds have been made. Maple mountain has only shipped six tons of ore, but the indications for a permanent camp are stated by some to be favorable.

The new plant for the sampling of both high- and low-grade Cobalt ores will shortly be in operation. The plant has a capacity of 30 tons per day.

During May, 18 Cobalt mines shipped 4,536,097 lb. The output for the first five months of 1910 is 60 tons less than the shipments for the corresponding period of 1909. The value of the ore is, however, much greater, on account of the larger number of concentrators now in operation. Besides this, approximately $60,000 worth of fine bullion was shipped from the cyanide plants of the O'Brien and Buffalo, which does not figure in the above shipments.

Toronto

June 6—The Canadian Government has appointed a royal commission on industrial training and technical education consisting of the following members: Prof. James W. Robertson, of Montreal, chairman; Hon. John N. Armstrong, North Sydney, N. S.; Dr. George Bryce, Winnipeg; Gaspard Deserres, Montreal; Gilbert M. Murray, Toronto, representing the Canadian Manufacturers' Association, and James Simpson, Toronto, representing the Dominion Labor Congress. Thomas Bengough, of Toronto will be secretary and reporter. The commission will begin its duties in July and after a tour of investigation throughout Canada will visit the United States, Great Britain, France, Germany and perhaps other European countries.

Official returns show that notwithstanding new discoveries the annual yield of petroleum in Canada is steadily decreasing. The Government pays a bounty of 1½c. per gal. The payments for last fiscal year ended March 31 were $203,588 as compared with $260,698 for 1909.

A merger has been arranged embracing several iron and steel companies, principally in western Ontario, and a charter applied for for the Canadian Steel Corporation, capital $25,000,000, with headquarters at Hamilton, Ont. The companies included are the Hamilton Steel and Iron Company, Canada Screw Company, of Hamilton, Nut and Bolt Company, Toronto, with branches at Brandford and Gananoque, and the Montreal Rolling Mills Company. A committee of four representing the companies are at work on the details. The project includes extensions to the plant of the Hamilton Steel and Iron works, comprising an additional blast furnace and the installation of a steel rod mill involving an expenditure of $1,500,000.

Mexico City

June 5—Unusual activity continues in the Altar placer fields. An evidence of this is in the figures obtained from the government offices at Hermosillo and Altar, which show that during April more denouncements were made in the Altar district than in all the other districts of Mexico. Most of these are denounced in the name of Luis Serrano, representative of the Banco de Sonora at Altar.

The building of the Pearson road, connecting Madera and Terrazas, in Chihuahua, with possible branches into Sonora, is stimulating mining along the route. The Tigre district is considering an outlet east from the Tigre district to Casas Grandes, which would give much cheaper rates into El Paso. It is reported that Charles Seawell, of Chihuahua, has obtained a concession to build a railroad into the Guaynopa district, and that a smeltery will be erected at the mines.

THE MINING NEWS

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

Alaska

The spring cleanup of gold for the Nome district is estimated at $1,175,000. The spring output of the Innoko and Haiditarod districts combined is estimated at $1,250,000.

Joe F. Plien, an Otter Creek operator, is building a dredge having a capacity of 2000 yd. per day. James Flodine will place a dredge on Arctic creek, a tributary of Cripple river, 18 miles from Nome. O. Silverton and A. Johnson will place a dredge on the Solomon river, on a claim adjoining the one which they have been working. Frank H. Waskey is building a dredge to be placed on Iron creek, in the Kougarok district, 55 miles from the coast. The latter three dredges will each have a capacity of 1500 cu.yd. per day and will be in operation by the middle of the summer.

Wanowky—Much development will be done this season on these gold mines, Seward district, by Watson & Snow.

North Star—This company has been incorporated at Cordova, and will start development on claims in the Abercrombie cañon on the railroad.

Cliff—The new mill is in operation. The result of an 18-day run is reported at $21,000. B. F. Millard, Valdez, is manager.

Alabama

Jefferson County

The red ore mine of the Schloss-Sheffield Steel and Iron Company, near Bessemer, which has been drowned for several months, has been unwatered and will resume at once.

Arizona

Gila County

Inspiration—Two drills are sinking on the Colorado claim, where a two-compartment prospect shaft is being put down. One of these holes has struck ore and the other is in the capping, which in this locality is 500 ft. thick. Thus far the orebody has been shown to extend over 2500 ft. west of the Joe Bush shaft and about 600 ft. east of it, making the length of the proved ore belt fully 3100 ft On the north edge is the Scorpion shaft. The orebody is thickest along the contact of the granite with the schist. The extraction tunnel in Keystone gulch, 500 ft. southwest of the Joe Bush shaft, has been driven 650 ft..

Old Dominion—The company is doing the bulk of its development work on the United Globe property, lying east and north of the main workings.

Dixon Copper Company—A two-months option on this property, 10 miles west of Globe, has been taken by John O'Keefe, of El Paso, for Pittsburg interests.

Pinal Mountain—This property, 8 miles south of Globe, has developed copper-gold ore. H. H. Harvey is in charge.

Arizona Commercial—The company will undertake an extensive drill exploration of the Black Hawk lode from the 700-ft. level. The adjoining Superior & Boston encountered ore on the Black Hawk lode at 1000 feet.

Live Oak—Drill hole No. 4, 600 ft. southwest of the vertical shaft, encountered chalcocite at 355 ft. and proved the orebody to be 90 ft. thick at that place. Hole No. 3 encountered ore at 320 ft. from the surface and passed through a body averaging 2½ per cent. copper for 130 ft. Drift No. 208, driven eastward on the 200-ft. level, has passed continuously through chalcocite ore averaging from 2 to 2½ per cent. copper for 200 feet.

National Mining Exploration—Drifting westward for 100 ft. on the stringer of ore cut on the 660-ft. level has shown the vein to have a width of 30 inches.

Warrior—The drill hole on the Winnie claim, near the line of the Inspiration, is 330 ft. deep. At this depth, gray schist, containing pyrite, has been encountered. From the stopes on the 250- and 300-ft. levels of the mine, 75 tons is extracted daily for shipment.

Yavapai County

Hillside Consolidated—The company is developing at Cherry. A small mill is in commission. M. M. Green is manager.

Arkansas & Arizona—The company operating in the Jerome district is installing pumps and machinery preparatory to sinking from 600 ft. to 2000 feet.

California

Butte County

George Strange—J. F. Lynch and R. A. Gruss have taken a bond on the property at Oregon City, where rich float has been found. Prospecting will be done.

Inyo County

Buckeye—The capacity of the mill is 300 tons daily. The electric road from the mine to the mill is completed. Mill buildings and power house are erected and machinery in place. Work is being done on the water-flume.

Mariposa County

Number Five—At this property near Hornitos, Martin Sutherland, superintendent, arrangements are being made to install machinery including a mill.

Exchequer—The directors have ordered E. S. O'Brien, manager, to raise the dam across the Merced river 15 feet higher and to begin the installation of machinery at the power house.

Modoc County

Fort Bidwell Consolidated—The largest transaction yet occurring in Hoag district was the recent transfer of 400,000 shares in this company to A. J. Cummings, of Detroit, Mich. A number of needed improvements will be made.

Mono County

Standard Consolidated—This company has been listed on the New York Curb. It owns the Bodie Consolidated, Bulwer, Mono and other mines at Bodie.

Nevada County

Oro Grande—This mine at Steep Hollow, 15 miles north of Grass Valley, will be opened by Hugh Craney and associates.

Plumas County

Dr. C. L. Burt has bought from Butterfield and Gobert the placer and quartz mines on Squirrel creek east of Quincy. The deal covers 400 acres of mining ground, including several rich small veins. Doctor Burt will develop the properties.

San Luis Obispo Company

La Cuesta—This company has found its two-stamp mill too small and has ordered a 10-stamp mill.

Shasta County

Several new stamp mills are being built in the Whiskytown district and new orebodies have been discovered.

Cave Creek—This company, owning the McClure group, is developing systematically.

Little Nellie—This property, near the Iron Mountain, will ship 100 tons daily to Martinez.

Evening Star—At this mine, Old Diggings district, new machinery is being installed.

Carnegie—Work has been resumed on this group, four miles from the Mammoth, formerly the Clipper.

First National Copper—The company has 5500 stockholders. All but 4000 out of the 600,000 shares have paid the

assessment. The company reports a working capital of $600,000 with no debt, and ore reserves of 1,800,000 tons.

Mad Ox—This mine near Stella has been leased to Mr. Lindboom, of Berkeley, who has started work.

Evening Star—Since this mine at Old Diggings, George Bayha superintendent, installed its machinery, it has shipped two carloads of ore daily to Kennett.

SIERRA COUNTY

Reese Ravine—The management intends to extend the tunnel on the Sebastopol side into the main ridge to tap the channel.

Ramshorn—S. Arnold has made first payment on this group to William Penman, of Goodyear Bar, and the ground is being prospected by tunnels.

Omega—Financial returns from this mine at Forest not having been satisfactory, F. W. Rohrer, of Berkeley, a large stockholder, has taken this in hand with a view to making improvements. The main tunnel will be driven and lateral gangways extended so more gravel may be extracted and a new tunnel will be started in a few days to tap the main body of gravel within 300 feet.

TRINITY COUNTY

Jewel Creek—Much gold has lately been taken out of this creek cañon near Minersville and the ground in the vicinity has been staked out and is being prospected.

TUOLUMNE COUNTY

Goldship—These mines, near Groveland, have resumed under charge of John D. Martini.

Chileno—This mine at Tuttletown, has been bonded to Frank L. Mitchell, of San Francisco, and active operations will be commenced.

Colorado

LAKE COUNTY—LEADVILLE

A. Y. & Minnie—The rebuilding of the the surface plant of this mine, recently destroyed by fire, is progressing rapidly and by late summer operations may be resumed.

Lovejoy—Good ore is being taken out of the tunnel being driven to intersect the Lillian gold oreshoot.

Evelyn and Castle View—These Carbonate hill mines have maintained a steady production during the past winter under the Nicholson lease. The Waterloo, Morning Star, Evening Star and Catalpa have also aided in sustaining the reputation of Carbonate hill for productiveness.

Ibex—Eighteen 75-lb. sacks of gold ore, estimated to yield 600 oz. per ton, have been shipped recently by Brown Brothers, lessees.

St. Louis—The rich gold streak has been proved to extend down to the third level, where it has been encountered recently, the vein at that depth being 5 ft. wide.

SAN JUAN DISTRICT

Yukon—This property, comprising 560 acres on Boulder mountain, has been started, under lease to W. B. Lowe. The development to date, 2500 ft. in the Yukon tunnel and 1400 ft. in the Lamont tunnel, and drifts and upraises, has been by hand work. Fifteen veins have been cut, ranging from 3 to 35 ft.

Gold Nugget—This group in Maggie gulch has encountered high-grade sulphide ore.

TELLER COUNTY—CRIPPLE CREEK

The output of the Cripple Creek district for May was 57,105 tons, having a bullion value of $1,349,502, or an average of $23.63 per ton, being 60c. per ton higher than the average for April. All the plants, except the Golden Cycle, report an increase in the tonnage treated over April, but it is generally understood that this latter plant bedded for future treatment a considerable portion of the ore shipped to it in May, thus making its decrease only apparent.

The deep drainage tunnel was advanced 393 ft. in May, making the total distance driven 13,611 ft., and carrying the breast to within 873 ft. of the El Paso shaft. About 100 gal. of water per minute is flowing through the tunnel.

Stratton's Independence—Results for April: Production, 2190 tons, averaging $22.66 per ton; dump ore milled, 6400 tons; net working profit to the company at mine and mill departments, $12,270.

Acacia—Lessees working through the Wrockloff shaft, at the north end of the Burns claim, have disclosed a new orebody, from which 50 tons of $20 ore have been broken in drifting on the vein. The Acacia company received over $600 in royalties in May from leasers.

Strong—Two cars of ore, estimated to carry 5 oz. gold per ton, were shipped from this property last week, the ore coming from a 4-ft. vein in the lower workings. The output from this mine is about 40 cars per month of ore, yielding from 2 to 16 oz. per ton.

El Paso Consolidated—A. L. Burris, president, has purchased the 75,000 shares held by George Bernard. A new orebody in the mine at the 300-ft. level is said to be running $100 per ton. The May production of this property amounted to 2750 tons.

Vindicator—This mine has discovered rich ore at the 1400-ft. level. The width of the vein is 7 ft. It is said that the Golden Cycle mine, adjoining, is also getting its richest ore at about the same depth.

C. O. D.—This old-time producer, in Poverty gulch, has started up under lease to the Frank Thomas Leasing Company.

Home Fraction—Lessees operating on this property on Gold hill, formerly belonging to the Temomj company, but now owned by the Stratton Estate, sent out the initial shipment last week. The ore came from 250 ft., is highly oxidized, and carries from $25 to $35 per ton.

Idaho

CŒUR D'ALENE DISTRICT

Stewart—The indebtedness of the company is reported at $40,000 and the production is $35,000 per month. The company is grading for the compressor, and a station is being cut for a shaft.

Jack Waite—This lead-silver mine will start shipments soon as the wagon road is finished.

Roanoke—This property, which includes the Sherman mine, is being developed by B. M. Francis, who has contracted to sink a 300-ft. winze on the ore and drift on the vein.

Indiana

CLAY COUNTY

Every mine in the district is working full force and full time. Any good miner can earn $25 a week. The cause of this activity is the strike of the Illinois miners. Illinois operators who hold coal lands in this field are preparing to sink shafts. The O'Gara Coal Company is putting down two block-coal mines south of Staunton. The Vandalia Coal Company will also commence work in a few days to sink two shafts in the same district, while between the two the Collins Coal Company will put down a shaft near Centerpoint. The Crawford Coal Company is opening a new shaft, as is also the Schripfarman Coal Company, just south of Brazil. Other companies will put down shafts this summer.

VIGO COUNTY

Mining bituminous coal without the use of explosives, doing away with the possibility of danger from such cause and greatly facilitating the work, has been given a thorough demonstration in mine No. 4 of the Deep Vein Mining Company, near Terre Haute. The demonstration was conducted by Dr. Henry M. Payne, of New York, and was successful in every respect. The machine, known as a hydraulic mining cartridge, is of simple construction and operates on the same principle as does a hydraulic-pressure jack. It is a cylinder of forged steel, 21 in. long and 3 in. in diameter and having eight duplex rams or pistons arranged in a row along one side. Water is forced through the cylinder by means of a high-pressure screw, which forces the rams or pistons out from the cylinder, thus dislodging the

coal without the danger from blasts and falling shale roofs. The preparation for the work is the same as when preparing to fire a shot. The coal is undercut and a hole is drilled for a blast. The machine is injected in the hole and by use of a high-pressure hydraulic screw the coal is dislodged with despatch. In two attempts made, 52 tons of coal were dislodged within 30 min. and the miners began loading the coal immediately, whereas they are usually forced to wait 24 hours or until the mine is cleared of dangerous gases and powder fumes after each blast.

Montana

Butte District

Butte & Superior—Superintendent Atwater expresses the belief that the new concentrating mill will be in operation in two months, at which time the company will increase its output to 450 tons per day, the ore for treatment being divided between the new concentrator and the Basin. It is reported not improbable that advantage will be taken of the offer of the Clark interests to treat some of the ore.

East Butte—The company has filed its annual statement as follows: Paid up capital $2,750,000; assets $6,149,812 and liabilities $149,812.

Butte & Ballaklava—The report is that the directors will declare a dividend within a short time. The company has been shipping to the Pittsmont smeltery regularly since March and is now mining between 100 and 200 tons daily.

Granite County

In the Georgetown district interest seems to be centered in situation of the Southern Cross mine. It has been known that the United States Smelting, Refining and Mining Company has had an option on the property but for what length of time, or at what figure is not made public. The rumors alternate between the consummation of the sale and a report that all negotiations are off. The officers of the Southern Cross company refuse to give out a statement. Martin & Newkirk are working the Venezuela mine which adjoins the Southern Cross and are mining $75 ore from a 7-ft. vein, recently cut. The incline shaft is down 75 ft. Hugh McFadden is working the Montana mine under lease. The lead at the surface is 50 ft. wide and at the 40- and 100-ft. levels shows the same width. Ernest & Benson are leasing on the Revenue and indications in the tunnel are good.

Lewis & Clark County

Empire—An Eastern syndicate has secured a lease on the mine, near Marysville and operations will shortly be begun under the direction of J. S. C. Wells. The mine was originally worked for gold but at depth the values turned to copper, silver and lead. A 50-stamp mill and a 500-ton cyanide plant are on the property.

Lincoln County

The Shaughenessy group, eight miles south of Libby, has been operated under lease by Town & McCorkle since February. The lower tunnel strikes the lead at 145 ft.; drifts have been run both ways. A shipment will soon be made. On what is known locally as the "Big Dike" south of Libby much work is being done. Hartz, Bockman, Blew & Campeau have recently let a contract for 200 ft. of tunnel on their claim, on the "Dike." The Bluebird Mining Company has also had a force at work on its claims under the direction of Henry Brink. The Crackerjack Mining Company has recently put men to work on its Vaughan and Greenwell placers, south of Libby, under the direction of Henry E. Kuphal and B. J. Lamey.

Missoula County

Black Bear—This property is being developed and a reduction plant will be installed. Albert Reeves, of Salem, is manager.

Sanders County

French Bar—The company owns the Golden Messenger, Faith, Little Dandy and Iron Quartz claims, near York. On the Golden Messenger, work on the new tunnel level was started in February. At 125 ft. south of the incline shaft, an east and west cross vein was encountered which has been drifted on 400 feet.

Nevada

Esmeralda County

Florence—The statement filed with the bullion tax collector for the first quarter of 1910 shows 10,516 tons mined, with a gross yield of $137,162. Cost of extraction was $71,016; reduction $39,844; smelting and sampling $14,524. Net profits $11,779.

Combination Fraction—A large orebody is being developed north of the main shaft near Mohawk ground, at 500 ft. The mill is almost ready.

Atlanta—J. A. Houlahan, of the Boom lease is installing a 25-h.p. hoist preparatory to more development on the 400-ft. level. There are now seven leasers actively at work on the Atlanta estate.

Merger—A second lot of 30 tons is ready for shipment by the Ford lease operators.

Goldfield Consolidated—J. W. Hutchinson, mill superintendent, is in New York securing data on the refining of bullion. It is planned to enlarge the refinery to over double its present capacity. Returns show that during May, 19,800 tons of ore were milled, dropping only 70 stamps, with a 95-per cent. extraction. Twenty of the new mortars for the mill are now on the ground.

Lincoln County

New York-Search Light—A 20-stamp mill will be built on the property. This follows the inspection of the property.

Prince Consolidated—The company has purchased the last one-fourth interest in the Davidson and California lode claims.

Nye County

Tonopah ore shipments for week ended May 29 are: Tonopah 3350 tons; Montana-Tonopah 1005; Tonopah Extension, 800; West End, 160; Midway, 50; total 6865 tons.

Tonopah—The diamond drill from the 1500-ft. station has proved lode porphyry at 2200 ft. after penetrating about 1500 ft. of rhyolite. Bullion shipments consisted of 74 bars valued at $65,000. An average extraction of 92 per cent. was recorded.

Tonopah-Belmont—The mill, after six months of idleness, is dropping 60 stamps, crushing 200 tons.

Tonopah Extension—Coarser screens have been installed at the batteries, increasing the capacity about 10 per cent. Bullion amounting to $14,000 resulted from cleanup for first half of May.

Bonnie Clare—The mines in the Gold mountain district are being opened up in anticipation of the completion of the railroad to the mill which should be in operation by July 15.

Pioneer—Fifty tons from the old lease dumps are being shipped daily to the Mayflower mill.

Montgomery Mountain—Samuel Newhouse, M. M. Johnson and H. E. Perry, of the reorganization committee have extended the time for subscribing stock in the new company until June 15.

White Pine County

Nevada Consolidated—During May, the company treated approximately 238,000 dry tons. The grade was a little over 2 per cent. On the Sunset claim, four or five drill holes have been put down. Owing to the capping, this ore is not adapted to steam-shovel mining.

Pennsylvania

Anthracite Coal

Philadelphia & Reading Coal and Iron Company—The report for the 10 months of the fiscal year from July 1 to April 30 shows: Receipts, $28,255,903; expenses, $27,176,005; net earnings, $1,079,898. As compared with last year, this shows decreases of $2,036,869 in gross and $602,899 in net earnings.

Bituminous Coal

Monongahela River Consolidated Coal and Coke Company—The report for the six months of the fiscal year from Nov.

1 to April 30 shows net earnings from operation of $775,036. Charges were for coal royalty, $221,531; depreciation of plant, $208,581; taxes, insurance and interest, $435,765; total, $865,877, leaving a deficit of $90,791. Net earnings decreased $203,413, notwithstanding an increase in coal mined; while the deficit compares with a surplus of $119,296 last year.

South Dakota

Minnesota—This mine has again commenced operations and is the only property in the district which is working under the former "open-shop" system.

Mogul and Golden Reward—These mines, near Terry, with mills near Deadwood, recommenced operations some time later than the Homestake and are also working continuously with nonunion labor.

Utah

Carbon County

Pittsburg-Salt Lake Oil Company—This company owns 480 acres of asphaltum land near Sunnyside. The country rock consists of interbedded sandstones and shale, some of the sandstone beds being more or less impregnated with hydrocarbons. This is a good grade of asphaltum, and in places constitutes up to about 10 per cent. of the rock. Plans are being made to develop the deposit, and produce asphaltum for paving.

Juab County

The Tintic ore shipments for the week ended May 27 are: Gold Chain, 2 cars; Undine, 1; Yankee, 1; Ridge & Valley, 3; Iron King, 6; Scranton, 2; Colorado, 9; Sioux Consolidated, 14; Dragon Iron, 33; Iron Blossom, 22; May Day, 2; Uncle Sam, 6; Eagle & Blue Bell, 3; Gemini, 4; Chief Consolidated, 2; Bullion Beck, 2; Centennial-Eureka, 28; Grand Central, 8; Victoria, 2; Lower Mammoth, 3; Mammoth, 1; Opohongo, 3; total, 157 cars.

Salt Lake County

The largest trestle on the Tintic branch of the Denver & Rio Grande was partially burned May 24. The Salt Lake road has put on two extra freight trains from the Tintic district to handle the ore while repairs are being made.

Columbus Consolidated—Three shifts per day are worked in the mill, and 20 tons of concentrates produced which net around $20 per ton. On the 400-ft. level, a strike of 4 ft. of ore running $50 in copper, gold, silver and lead has been announced. The company is following it to the contact.

Prince of Wales—Ore carrying galena has been uncovered at the surface near the old workings of the mine at Alta. The strike is reported to be about 6 ft. wide, and has been uncovered for 50 feet.

Rexall—A contract has been given for driving the main tunnel 200 ft., which will give it a total length of 1000 ft. This is expected to take it into the beds in which the Cardiff company has opened ore.

Lower Mammoth—The draft on the 2000-ft. level is being continued south to the contact. A winze is being sunk in ore below the 2000 level. The winze was started on one of the walls of the high-grade ore encountered a few weeks ago. Shipments are being made from development on this level together with ore from between the 1700 and 1800. On the 2100-ft. level ore carrying more gold than usual has been opened.

Opohongo—From three to four carloads of ore are being shipped a week, a greater part of which is being mined on the 400 level. The company is working 28 men. No merger is pending between the Opohongo and Gold Chain as has been reported, though the companies have an operating agreement.

Iron Hat—The claims of the Three Metals Mining Company in East Tintic have been acquired by this company.

Carisa—Between 5 and 6 ft. of ore have been opened in a raise from the 500 level. Three feet of this shows galena and assays 32 per cent. lead and 40 oz. of silver. This ore is in unprospected territory.

Iron Blossom—Drifting is being done on the 600-ft. level to cut the gold vein opened by the workings on the 500. The copper vein has been followed from the 700- to the 1100-ft. level.

Governor—Operations will be started soon by this company in search of the gold vein of the Iron Blossom, developed to within a short distance of the northern boundary of the property.

Tintic Central—Three shifts are being worked in the shaft which is now at 800 feet.

Summit County

American Flag—Ore running well in gold, silver and lead is reported to have been opened on both the 500- and 1100-ft. levels.

New York Bonanza—In the face of the drift on the 800-ft. level, a fissure has been encountered 3½ ft. wide and filled in part with lead carbonate. The strike is southeast of the shaft in ground not developed by the upper levels.

Tooele County

Dry Cañon—The first shipment from the old Kearsarge mine in Dry cañon, recently taken under lease by this company, assayed: Gold, 0.14 oz.; silver, 32.1 oz.; lead, 20.3 per cent.; copper, 2.7 per cent.; iron, 12.4 per cent. Development was carried into new territory. The Kearsarge in former years produced extensively from one shoot.

Ibex Standard—A consolidation of the Ibex and Vindicator mine was ratified at a meeting of the stockholders in Mercur. The stock is to be increased from 125,000 to 500,000 shares, of a par value of 25c.; 175,000 shares will be used in payment for the Vindicator claims, the remaining 200,000 shares being treasury stock. A compressor will be installed and development started.

Washington

Ferry County

Republic—Arrangements have been made by Manager J. L. Harper, with the Tacoma smeltery, to increase the monthly ore-treatment contract from 2000 to 3000 tons for three years.

Pacific Ore Reduction—This company, E. R. Davidson, manager, has broken ground for a 100-ton custom cyanide mill at Republic. The schedule of charges ranges from $3 to $4.50 a ton.

Okanogan County

Jim Hill—Buildings are being erected and preparations made to start a tunnel. Machinery will be installed.

Wyoming

One million three hundred thousand acres in Wyoming have been withdrawn from coal entry, pending classification and valuation.

Canada

British Columbia

Slocan Star—Byron N. White, of Spokane, Wash., managing director, is at Sandon, arranging for resuming work on a large scale in the mine and mill, which have been tied up by litigation.

Whitewater—Concentration will be resumed at the mill. Exploration in the Whitewater Deep mine has been in progress throughout the winter. The Deep Mine, Ltd., working another part of the property, has let a contract for 150 ft. of raising from the lowest adit, driven in 1909 to 2000 ft., and has arranged for opening exploratory workings at the top of this incline raise. The old mine workings are 500 ft. above the deep-level tunnel.

Ontario

The shipments from Cobalt for the week ended May 27 are: Kerr Lake, 304,346 lb.; La Rose, 380,988; Crown Reserve, 148,315; Temiskaming, 80,000; Right of Way, 58,000; Chambers Ferland, 58,300; Trethewey, 56,300; Nipissing, 56,000; Buffalo, 57,780; Bonsall, (Gowganda), 20,080; total, 1,220,109 pounds.

Foster—Drilling at 400 and 500 ft. has given good indications.

King Edward—A new high-grade vein has been cut on the 70-ft. level.

Paymaster—This property has started work again.

Laguna—Work will be recommenced.

Coniagas—The first vein picked up on the third level in the conglomerate shows as high values as on the second.

Drummond—The extension of the Hargraves vein has been located and shows silver.

La Rose—Surface trenching at the Fisher-Eplett property has disclosed numerous veins with cobalt and silver.

Peterson Lake—The struggle for control was decided at the meeting, May 30, by the election of a new board of directors, including Sir Henry Pellatt, Major Murray, J. W. Scott, Col. A. M. Hay, and Hugh Blain. Only one of those elected, Vice-president J. W. Scott, was a member of the former board. A resolution was passed in favor of extending the leases.

Trethewey—The new vein at the 75-ft. level has been tapped again at 150 feet.

Union Pacific—A contract has been signed for sinking the shaft to 200 feet.

Temiskaming—The main shaft, down 450 ft., is being sunk to 500 ft., which will give the deepest working mine in Cobalt.

Bonsall—This Miller Lake mine has made an initial shipment of 10 tons to the Deloro smeltery.

McKay—This Gowganda property has cut the Morrison vein at the 100-ft. level.

Dominion Iron and Steel—The output for year ended May 31 was: Pig iron, 255,717 tons; steel ingots, 302,216; rails, 146,910; rods, 81,579. The output for May was: Pig iron, 22,585; steel ingots, 26,455; rails, 13,962; rods, 3975 tons.

QUEBEC

The recently discovered Graphite deposits at Amherst 90 miles northeast of Montreal are being equipped with a plant consisting of an 80-h.p. boiler, compressor and hoists. The vertical shaft has a depth of 50 ft. but will be sunk to 100 ft. The ore is a flaky ore of high grade, occurring in lens-shaped bodies and veins over 200 ft. wide in a pyroxene formation.

Dominion Gold Fields—This company, formerly the Beauce Gold Fields Syndicate, is pushing exploration on the Gilbert river, county of Beauce. Drills are at work on the right bank of the river on lot 9 and 10, and at 24 ft. an ancient river channel has been found, running parallel with the Gilbert. On the upper Des Meules creek tests have demonstrated that part of the ground which had been washed 20 years ago still contains coarse gold in paying quantities. A survey is in progress for a ditch from Mill river, 3 miles distant. It is proposed to exploit the alluvial deposits by means of an hydraulic elevator. H. N. Ball, is in charge.

Mexico

CHIHUAHUA

Año Nuevo—This company, successor to the Mary Mining Company, has completed a cyanide plant at Arechuyvo.

Sierra—The 20-stamp mill at El Salto, Ocampo, is operating. Robert Linton is in charge.

GUANAJUATO

San Cayetano—The capital of the company has been increased to $1,500,000. The Adolph Lewisohn interests, of New York, are in control.

SONORA

A petition has been filed with the Federal government by the Copper Queen Mining Company, asking for concessions to transmit electrical power from Douglas, Arizona, to the El Tigre, Roy, North Tigre, South Tigre and Cinco de Mayo mines. The locality is but 50 miles south of the border and no opposition to the project is expected.

Nacori Chico—These properties, which yielded some surface outcroppings rich in gold, and created considerable excitement three months ago, have been disappointing, and but little work is now in progress.

Mendorico—This company has relinquished its lease on the Mina Grande mine, Moctezuma district.

Carmen Consolidated—The long-contested suit between J. P. Casey and C. B. Bell, for one-half of the receipts from a sale of the company's stock, has been decided in favor of the plaintiff, Bell.

Ancient Gold—This company, owning the Reyes and Cura Morales mines, Ures district, has developed gold-silver ore in a 200-ft. tunnel. The erection of the 200-ton mill is planned.

El Temblor—Final payments have been made on this property by H. C. Carr and associates.

Pedrazzini—An incline shaft on the Mercedes, 15 miles south of the Chispas mine, has revealed ore averaging 15 per cent. lead, 25 per cent. zinc and 20 oz. silver. A site is being graded for a 100-ton mill, which will be speedily erected.

Creston de Cobre—Since the recent placing of a large pumping plant on this property, 30 miles west of Hermosillo, the work of crosscutting the veins has gone steadily forward. Work on a reduction plant will shortly be resumed.

Greene-Cananea—Experimental smoke tests are being made by this company, with a view of determining the loss through this channel, and to take steps to save a part.

Mazatan—This company, of Boston, offices at Hermosillo, has commenced, at the base of the west slope of the Rodirquez mountain, a tunnel to be used as a drain, a general transportation and prospecting tunnel for the mine. A contract is let to drive this tunnel 2000 ft. This company is sinking a shaft on its No. 2 property, and has struck shipping ore at the 150-ft. level. A steam hoist and concentrating plant are being shipped to the property.

Cerro de Plata—This company, of Lexington, Ky., operating 18 miles northwest of Imuris, is developing a large ore-shoot. A 20-stamp mill and cyanide plant will be installed. Frank Strauk is superintendent.

Africa

RHODESIA

Gold production in April is reported at 54,237 oz., being 40 oz. less than in March. For the four months ended April 30, the total was 195,301 oz. in 1909, and 210,870 oz.—or $4,358,683—in 1910; an increase of 15,569 oz. Other production reported for the four months in 1910 included 76,340 oz. silver; 27 tons copper; 252 tons lead; 16,705 tons chrome ore; 15 tons asbestos. The coal production, all from the Wankie mines, was 54,720 tons. The number of men employed at the mines at the beginning of April was 34,855, of whom 1730 were white men and 33,125 negroes.

WEST AFRICA

Gold production of the Gold Coast and Ashanti in April was 16,363 oz., a decrease of 1264 oz. from March. For the four months ended April 30, the production was 88,897 oz. bullion in 1909, and 68,323 oz. in 1910; a decrease of 20,574 oz. The bullion reported this year was equal to $1,353,863, or 65,499 oz. fine gold.

Asia

KOREA

Oriental Consolidated—The May cleanup was $130,500.

Australia

QUEENSLAND

Gold production in Queensland in April is reported at 38,700 oz. This makes a total of 139,934 oz., or $2,892,436, for the four months ended April 30; an increase of 19,812 oz., or $409,514, over last year.

Central America

COSTA RICA

Montezuma Mines—The company assets have been sold at court sale, to Bancroft Smith, for $45,000. The liabilities were $76,127.

New Caledonia

The only exports of ore reported by the *Bulletin du Commerce*, of Noumea, in March were 7790 tons nickel ore. This makes the total exports of nickel ore from New Caledonia for the three months ended March 31, this year, 23,318 tons.

THE MARKETS

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

Coal Trade Review

New York, June 8—In the East the bituminous-coal trade is quiet with some signs of improved demand, and with labor troubles generally adjusted. Car shortage is beginning to be a source of some complaint. The anthracite trade is quiet and uneventful.

In the West the situation is gradually adjusting itself as far as the Illinois line. In Ohio and Indiana there is some friction over local agreements, but no serious differences. In Illinois, however, the situation is serious. The southern districts, which seceded from the State association, are at work, but in the northern and central districts the strike is growing acute, and the local unions have taken the extreme step of calling out the engineers and pumpmen, which will seriously embarrass the operators. The latter continue firm in their position. In the Southwest no change is reported.

Coal Traffic Notes

The Department of Mines of West Virginia reports the production of coal in the State in 1909 as follows: Used in operating mines, 751,985; sold to local trade 380,430; used at coke ovens, 4,646,905; shipped from mines, 35,734,446; total, 41,513,766 long tons, an increase over 1908 of 2,326,756 tons. The coke made was 3,125,451 short tons, an increase of 2,326,756 tons over the previous year.

Coal tonnage reported by the Monongahela River Consolidated Coal and Coke Company, six months of fiscal year from Nov. 1 to April 30, short tons:

	1908-9.	1909-10.	Changes.
River coal.....	2,529,439	2,158,047	D. 371,392
Rail coal.....	339,695	1,017,061	I. 677,366
Total.....	2,869,134	3,175,108	I. 305,974

The decrease in river shipments was offset by a very large increase in rail shipments; the total gain being 10.7 per cent.

Shipments of anthracite in May are reported at 5,679,601 long tons, being 544,795 tons less than in April, but 615,788 tons more than in May, 1909. For the five months ended May 31 the shipments were 27,043,872 tons in 1909, and 27,416,625 in 1910; an increase of 372,753 tons, or 1.4 per cent., this year.

Shipments of anthracite by Lake from Buffalo for the season to May 31 were 926,870 tons, an increase of 445,025 tons over last year.

Coal tonnage originating on the Southern railway lines, three months ended March 31 was: Tennessee district, 332,192; Alabama district, 748,039; total, 1,080,231 short tons, an increase of 275,788 tons over last year.

New York

Anthracite

June 8—There is about the usual business forward. Most collieries are running steadily, the only exception being the Erie Railroad mines where the foreign miners are on strike; and this trouble is today settled.

Schedule prices for domestic sizes are now $4.45 for broken and $4.70 for egg, stove and chestnut, all f.o.b. New York harbor points. For steam sizes current quotations are: Pea, $3@3.25; buckwheat, $2.20@2.50; No. 2 buckwheat or rice, $1.65@2; barely, $1.35@1.50; all according to quality, f.o.b. New York harbor. The lower prices are usually for washery coals.

Bituminous

The seaboard soft-coal trade continues to look up a little so far as sales are concerned. New England is buying more, and New York harbor trade is better, though still irregular. Buyers show an obstinate preference for the lower-priced coals, apparently looking at cheapness rather than quality.

There is no change in quoted prices. Good Miller vein steam coal can be had at $2.65@2.70, f.o.b. New York harbor; and there is a range of 20c. below this and 25c. above for coals of lower or better quality. Gas coal is in good demand, but at low prices.

Car supply is still irregular and mines are complaining. Transportation is fair, but there are occasional delays in getting coal to tide.

In the coastwise-vessel market the demand for boats is still fully up to the supply; in fact, smaller boats are a little scarce. Owners hold to 70@75c. from New York to points around Cape Cod, and no charters can be had for less.

Birmingham

June 7—The coal demand in Alabama is improving. So far all deliveries are on time and up to contract. The operators assert that the contracts in hand call for a large quantity of coal but that there is sufficient time given for the delivery. Coal prices are not so strong. The larger consumers who buy at close figures have been in the market. Labor is needed in some parts of the coal-mining section.

The Mulga mine of the Birmingham Coal and Iron Company, where an explosion occurred on April 20, has resumed operations. Extensive repairs were made in the mine and additional improvements were put in to prevent every possibility of trouble. Sprinkling machines and electric-firing wires, so that all firing will be done after the men have left the mines, have been put in and other improvements made. The mines of the Palos Coal and Coke Company, where an explosion occurred on May 5, will not be ready for a resumption of operations for 30 or 40 days yet. Many improvements have been recommended by the State mine inspector at this place which must be put in before the resumption can take place.

Chicago

June 6—Larger sales are being made of Eastern coals, particularly to railroads, in default of any resumption of supplies from the Illinois mines, and the amount of such coal sold doubtless will continue to increase as the big consumers of steam coal come to the bottom of their storage piles. It will be, however, as it is now, buying in small lots, by most steam-coal users, for the man who has been accustomed to Western screenings at $1.40@2 does not fancy having to pay double that price or more for smokeless or Hocking. Nor does he fancy paying $2.25@2.50 for Indiana screenings as he has to do now. The market, however, must continue to use a large amount of coal, even with users economizing as much as possible. So the market for coals from east of Illinois is a large one.

Indiana and such Illinois coal as gets into market bring $2.50@2.60 for lump, $2.30@2.40 for run-of-mine and $2.25@2.50 for screenings. Smokeless holds up to circular prices of $3.55 for lump and $3.15 for run-of-mine and Hocking to $3.15. There is considerable fluctuation from these prices from day to day, and it may be said, indeed, that there really are no fixed market prices now. The supply of Eastern coals is well regulated, apparently through close watching of day-to-day conditions, but there is little danger of overshipping for the next week at least.

Cleveland

June 6—Some small troubles still remain to be settled in some of the Ohio districts, but nothing serious, and coal is coming forward freely. Indiana mines seem to be furnishing the Chicago market now, and little Ohio coal is going there. The Lake trade is improving.

Quotations for Middle district coal, f.o.b. Cleveland, are $2 for 1¼-in., $1.85 for ¾-in., $1.75 for run-of-mine and $1.65 for slack; No. 8 district from 15 to 20c. higher. Massillon domestic is $2.95 for lump and washed nut, and $2.65 for slack. Pocahontas is quoted $2.85 for lump and $2.45 for run-of-mine.

Indianapolis

So far as Indiana is concerned, the coal market is excellent. There is no accumulation of coal; it is moving rapidly to the markets where it is already sold at good prices. The operators are not expecting this harvest to last a great while and are booking orders for future delivery when opportunity is given. The premium prices that now prevail at the mines will not rule after mines are opened elsewhere. They also realize that the labor question is not yet completely settled in this State. Four weeks of deliberation have failed to bring the desired satisfactory agreement between miners and operators. While the situation is nervous, the work of production is being pushed to full capacity. Indiana coal operators do not fathom the purposes of the railroad companies in advancing freight rates on coal for manufacturers in the State.

Pittsburg

June 7—The coal market is in good condition, and operators are well pleased with the situation, considering the backwardness in some other lines. Lake shipments have been heavy, nevertheless some producers are behind their requisitions. Demand from manufacturers is fairly good. The car supply is adequate. Prices last reported are well maintained: Mine-run and nut, $1.20@1.25; ¾-in., $1.30@1.35; domestic 1½-in., $1.50; slack, 80@85c. per ton.

Connellsville Coke—The market has been quiet. A contract for 4500 tons furnace coke monthly over second half has been put through at $1.70. Prompt furnace coke has been sold at $1.60 and at $1.65 per ton.

The Thompson-Connellsville Coke Company, with two plants of 400 ovens each, the Tower Hill-Connellsville Coke Company, with two plants of 250 and 310 ovens and the Isabella-Connellsville Coke Company, a new company which expects to have 200 ovens completed by Oct. 1, are to unite as the Thompson-Kuhn Coke Company. Directors controlling 85 per cent. of the capital stock have agreed to the terms of merger, which represents practically the exchange of stock in the three companies for stock in the new company. When this consolidation is effected efforts will be made to bring in about a dozen other and smaller interests in the neighborhood.

We quote standard grades of Connellsville coke: Prompt furnace, $1.65@1.70; second half contract, $1.70@1.80; prompt foundry, $2.15@2.25; contract foundry, $2.25@2.50 per ton.

The *Courier* reports the production in the Connellsville and lower Connellsville region in the week ended May 28 at 396,443 tons, an increase of 3000 tons, and shipments at 4066 cars to Pittsburg, 6172 cars West and 1084 cars East, a total of 11,322 cars.

St. Louis

June 6—The market for the past week has remained about stationary, though a slight downward tendency is noted. Operators who can tie up a big bunch of coal for delivery extending three or four weeks are willing to take it at slightly under current figures. As yet there seems to be no indications that the Carterville and Springfield districts will sign up. As long as these mines stay out the price of coal will remain about stationary. The railroads are all buying coal heavily, and in fact are taking most of the coal that is being made. A number of industries, such as the brick, firebrick and cement companies, in whose cost of production coal figures very largely, have practically shut down. St. Louis is a big center for these industries, consequently a number of the largest buyers of coal are not on the market.

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

	Mine.	St. Louis.
Illinois, Standard:		
Mine-run	$1.50	$2.02
2-in. lump	1.75	2.27
2-in. screenings	1.60	2.12
Pocahontas and New River:		
Lump or egg	1.50	4.00
Mine-run	1.10	3.65
Pennsylvania Anthracite:		
Nut, stove or egg	.....	6.55
Grate	.....	6.30
Arkansas Anthracite:		
Egg or grate	3.35	5.35
Coke:		
Connellsville foundry	.....	5.40
Gas house	.....	4.50
Smithing	.....	4.15

Mine-run is practically the only size that is being made at present. The demand for screenings far exceeds the supply and screenings are bringing higher prices than mine-run. Lump coal, however, is not in very good demand, consequently few screenings are being made.

A little trouble has been experienced by the Fifth and Ninth districts since signing up and several mines have been shut down for a day or two on account of dissatisfaction of the miners with the terms of the agreement. One clause in particular, which the miners agreed to, was if there was going to be a closed shop on one side there was to be a closed shop on both and the miners agreed to work only for mines that were members of the Operators' Association outside of the independents who had signed up prior to the time the agreement had been made. While this included nearly the entire district yet there are a few large mines shut down on this account. In two mines the drivers were not satisfied with the scale that was signed by their representatives and refused to abide by it, insisting upon more money and as a consequence shut down these mines for several days. It is therefore evident that the operators of the two districts have a number of matters to thrash out before the agreement made will be satisfactory to all parties.

The anthracite trade has been good and continues to hold up. All sizes are selling well, including chestnut which has been a slow seller. This is due to the fact that the country trade has opened up and is taking coal.

FOREIGN·COAL·TRADE

United States Coal Exports—Exports of coal and coke from the United States, with coal furnished to steamships in foreign trade, four months ended April 30, long tons:

	1909.	1910.	Changes.
Anthracite	699,350	950,454	I. 251,104
Bituminous	2,072,696	2,573,135	I. 500,439
Total exports	2,772,046	3,523,589	I. 751,543
Steamer coal	1,908,202	2,068,230	I. 160,028
Total coal	4,680,248	5,591,819	I. 911,571
Coke	330,370	307,863	D. 22,507

Canada took this year 2,385,817 tons of coal or 67.7 per cent of the total. Cuba took 269,643 tons of coal. The coke went chiefly to Mexico and Canada. Of the bunker coal reported this year 2,046,993 tons were loaded at coast ports and 21,737 tons at Lake ports.

United States Coal Imports—Imports of coal and coke into the United States, four months ended April 30, long tons:

	1909.	1910.	Changes.
Anthracite	3,115	22	D. 3,093
Bituminous	388,077	623,167	I. 235,090
Total coal	391,192	623,189	I. 231,997
Coke	64,186	37,454	D. 26,732

Canada furnished this year 537,517 tons of coal and nearly all the coke; Australia, 35,197 tons of coal; Japan, 45,937 tons of coal. Imports are chiefly on the Pacific Coast and in the far northwestern States.

French Coal Production—Coal production in France for two years, metric tons:

	1908.	1909.	Changes.
Coal	36,632,724	37,253,305	I. 620,581
Lignite	751,600	718,553	D. 33,047
Total	37,384,324	37,971,858	I. 587,534

Of the total in 1909 the Nord and Pas-du-Calais furnished 24,951,607 tons; the Loire, 3,730,101 tons.

Welsh Coal Prices—Messrs. Hull, Blyth & Co., London and Cardiff, report current prices of Welsh coal as follows, on May 28: Best Welsh steam, $4.02; seconds, $3.81; thirds, $3.66; dry coals, $3.72; best Monmouthshire, $3.60; seconds, $3.48; best steam smalls, $2.16; seconds, $1.92. All prices are per long ton, f.o.b. shipping port, cash in 30 days, less 2½ per cent. discount.

IRON·TRADE·REVIEW

New York, June 8—Without any marked change, the iron and steel markets show more activity in several lines. There is, however, an insistent demand for concessions, which shows that much of the improvement in the buying demand which has been recently shown depends on the maintenance of a low range of prices.

In pig iron there has been rather heavy buying of foundry iron in Eastern territory, coupled with many inquiries for second-half needs. It is evident that many large users of pig are approaching the end of their stocks, but they are still unwilling to buy, except at concessions, believing that the bottom has not yet been reached. Basic iron in the Central West is in much the same position. In the East some trade has been taken by Virginia and Alabama furnaces, which are willing to meet buyers' views, and a few Eastern furnaces have followed.

Preliminary estimates show that the production of pig iron in May was about 100,000 tons less than in April; the loss being about equally divided between the steel works and merchant furnaces.

In finished material buying is better, but there also low prices are demanded. This is especially the case with structural steel, for which many small orders are forward. Some larger contracts are under discussion. In other lines business is improving. The jobbing business in bars and small material is generally good.

The Panama Canal Commission is beginning to market the great accumulations of scrap. One cargo, consisting of 1,991,500 lb. mixed iron and steel scrap, was offered to bidders this week.

Iron Shipments by River—The United States Steel Corporation, through the Carnegie Steel Company, has let contracts for several steel barges, to be used in shipping iron and steel from Pittsburg down the Ohio and Mississippi rivers to points in the South. The barges will be built by the American Bridge Company.

Baltimore

May 6—Exports from Baltimore for the week included 1,618,000 lb. zinc dross to Liverpool. Imports included 2475 tons spiegeleisen and 400 tons ferromanganese from Rotterdam; 26,950 tons iron ore from Cuba.

Birmingham

June 7—Small-lot purchasing of pig iron is noticed in Southern territory, the aggregate showing up well. The market is far from being strong yet, but the manufacturers say that there is much improvement as compared to a month ago. There has been one blast furnace blown in since last week, which had been out for repairs. It is understood that one or two furnaces now in operation will shortly be blown out for necessary repairing. The pig-iron demand right now is equal to the make and a little better. The quotations are now firm at $12 per ton, No. 2 foundry; in fact, there is intimation that the prices for the product are going to be increased shortly. The inquiries for iron received by Southern manufacturers indicate there is need for a large quantity of iron. There is no delay in deliveries.

Chicago

June 6—Buying of pig iron has been more general in the last week than for several weeks previously, and the stronger condition bids fair to continue. Sales of malleable especially have been large. The foundry melters, the chief buyers in this market, are placing contracts for last-half tonnage at $11.50@12, Birmingham, or $15.85@16.35, Chicago, for Southern No. 2 and $16.50@17 for Northern No. 2. Increased buying has tended to stiffen prices. Southern holds generally to $12, at which it has a slight advantage over Northern. Apparently the melters have concluded that the wait for a lower price than $11.50, Birmingham, has gone to its limit and recognize that the turn of the market is decidedly upward, the production of pig iron having been curtailed long enough to reduce furnace stocks to the market requirements. That being the case, we may look for very general buying for the next two or three weeks. There is still an element of the melters that holds to the policy of buying in small lots for delivery within 30 to 90 days, but in general the trade is becoming a strong one for the last half, with some disposition to reach into 1911 deliveries, though this is yet confined almost wholly to inquiries. Furnace agents are inclined to name low prices on the nearer deliveries and hold out for higher on the more extended requirements. Northern furnaces are getting a larger share of the tonnage with the stiffening of Southern.

In iron and steel products buying is generally good, though railroads have to some extent held off because of wage and rate troubles. Structural steel is active. Coke sells well at $5 for the best Connellsville.

Cleveland

June 6—Some trouble was caused last week at the ore docks by a strike of the dockmen, but the trouble has been adjusted. No sales reported.

Pig Iron—A number of inquiries and sales are reported, mostly for small lots, but making up a good aggregate tonnage. Current quotations, Cleveland delivery, are $16.90 for bessemer; $15.75@16 for No. 2 foundry; $16.10@16.35 for No. 2 Southern; $18.50@19 for Lake Superior charcoal.

Finished Material—Several local contracts for structural steel are being closed. Some more orders for bars are also noted. Mills report specifications on contracts coming in more freely; while jobbers report small trade active.

Philadelphia

June 8—Brokers and furnace agents agree in the statement today that the demand for pig iron, outside of basic, has fallen off. Besides this a few inquiries from large buyers outside of this territory have been withdrawn, the supposed reason being that consumers scent a further drop. The influences underlying the market point to further weakness, particularly in steel irons. A few furnace companies in this territory offered to furnish iron up to the end of the year at the prices named, but up to today none of these offers has been accepted. Basic iron is offered at $16, and business is pending at a shading from this figure. Gray forge has been dull even at a shading under $16 for Pennsylvania make. The weakness of forge is due to liberal offerings of Southern forge and to a purpose of Southern makers to entrench themselves more strongly in this territory. Several large foundry interests have allowed their stocks to run low and they will probably continue their hand to mouth buying throughout the summer unless conditions change radically. There is a difference of $1 to $1.50 in No. 2 foundry, and this difference may be increased.

Bars—Reports today from interior mills show most of them with a fair amount of orders, while some may be obliged to restrict production in July unless orders come in. Quotations are fractionally lower. City and country stores maintain the usual average of sales.

Sheets—Recent business is less encouraging because of the cautious course of large buyers. Prices have been practically uniform on the small orders reaching the mills.

Pipes and Tubes—Late advices from pipe mills show no lessening in output, but less buying of raw material. Tube discounts are unchanged and no new orders of any consequence have been sent to the mills.

Plates—The probability of shading has served to hold up some pending business. The mills are well supplied for the present and the inquiries made show a large amount of business within reach.

Structural Material—Weakening influences are at work and further shadings have been made. The business in the past week has been confined to relatively small lots.

Scrap—The scrap market is absolutely featureless and makers of scrap are offering supplies of various kinds at lower prices than have prevailed for some months.

Pittsburg

June 7—There are two iron and steel markets, a sentimental and a practical. The former has shown many fluctuations this year; while last week it was reported much depressed over the suit brought on Tuesday by the Government against certain midwestern railroads to enjoin freight advances announced for June 1, again this week it is reported as correspondingly encouraged over the apparent compromise reached at the White House conference Monday. The practical market, on the other hand, has shown relatively little fluctuation this year. It has comprised a pretty steadily declining volume of business. As the depletion occurred in each line prices softened slightly, except in the case of pipe, where the first restriction in output occurred. Pipe presented so serious a case that the mills recognized price-cutting would do absolutely no good. Reports of cancelation and withholding of orders by railroads, on account of opposition to freight rate advances, are obviously overdrawn. Moreover, the proportion of iron and steel production passing to railroad consumption is popularly overestimated. Production promises a further curtailment this summer.

Pig Iron—On the inquiries for foundry iron by the Westinghouse Air Brake Company and the Babcock & Wilcox Company mentioned last week, less iron has been bought than was expected. Latest advices are that none of the Babcock & Wilcox business has been closed, while the air-brake company is reported to have bought a moderate tonnage, probably less than 5000 tons, of storage iron at a special cash price quite below the furnace price. Bessemer and basic iron are quotable at 25c. lower, and prices even below the new open quotations have been made in special cases. Pig iron is now clearly below the cost of production at Valley furnaces, using purchased ore and coke. The question now is whether the demand will be restricted to the tonnage which can be made by furnaces which have raw material connections of their own. They have room for further cutting, but if the market requires iron made by furnaces which purchase their raw materials, prices must advance. We quote at Valley furnaces, 90c. higher delivered Pittsburg: Bessemer, $15.75@16; basic, $14.75@15; No. 2 foundry, $15; forge, $14.50; malleable, $15.25 per ton.

Ferromanganese—The market is extremely quiet and nominally quotable at about $40.50, Baltimore.

Steel—The market is softer on bessemer steel, there being resales, also surplus production of rail mills. Open-hearth continues scarce. We quote: Bessemer billets, $25@25.50; sheet bars, $26@26.50; open-hearth billets, $28@28.50; sheet bars, $29@29.50; rods, $31@32, all f.o.b. mill, Pittsburg or Youngstown.

Sheets—Demand is moderate and shading is about the same as formerly, $1 to $2 on black and $2 to $3 on galvanized, from regular prices which are 2.40c. on black and 3.50c. on galvanized, with painted corrugated roofing at $1.70 a square and galvanized at $3. Blue annealed sheets continue scarce, at about 1.90c. for prompt delivery, the regular price being 1.75c. for late delivery.

St. Louis

June 6—The market for pig iron remains slow, though business picked up a little last week. Buyers are evidently of the opinion that the bottom has been reached and feel that they can get no further price concession by withholding from the market. The price is $12 f.o.b. Birmingham, or $15.75 St. Louis, and is the lowest price since the panic.

FOREIGN IRON TRADE

United States Iron Ore Movement—Imports and exports of iron ore in the United States, four months ended April 30, long tons:

	1909.	1910.	Changes.
Imports.....	350,440	825,018	I. 474,578
Exports.....	32,921	36,839	I. 3,918

Of the imports this year 502,680 tons came from Cuba and 268,804 tons from Europe.

Imports of manganese ore for the four months were 68,123 tons in 1909, and 81,013 in 1910; increase, 12,890 tons.

METAL·MARKETS

New York, June 8—The metal markets generally, while they show no marked change for the week, have had rather a downward tendency, with no special activity.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal.	Exports.	Imports.	Excess.
Gold:			
April 1910..	$36,283,625	$ 2,100,918	Exp. $34,182,707
" 1909..	6,337,994	3,345,861	" 2,992,133
Year 1910..	47,199,706	11,669,276	" 35,530,430
" 1909..	44,316,626	15,504,136	" 28,812,490
Silver:			
April 1910..	4,696,534	3,840,495	Exp. 856,039
" 1909..	4,952,251	4,222,147	" 730,104
Year 1910..	18,336,081	15,238,634	" 3,097,447
" 1909..	19,426,181	14,675,365	" 4,750,816

Exports from the port of New York, week ended June 4: Gold, $220,600, to Cuba and South America; silver, $933,525, to London and Paris. Imports: Gold, $117,330, from central and South America; silver, $183,801, from the West Indies and Mexico.

The Treasury Department estimates the gold in circulation in the United States on June 1 at $594,954,808. On the same date the treasury held $175,469,637 gold in its current balances and $857,003,869 against gold certificates outstanding.

Exports of silver from London to the East from Jan. 1 to May 26, reported by Messrs. Pixley & Abell:

	1909.	1910.	Changes.
India.....	£2,161,200	£2,640,340	I. £ 479,140
China.....	1,075,100	1,113,500	I. 38,400
Straits.....	82,800	.....	D. 82,800
Total.....	£3,319,100	£3,753,840	I. £ 434,740

India Council bills in London sold at an average for the week of 15.94d. per rupee.

Messrs. Pixley & Abell write from London: "On May 24 news was received that the Chinese Government had published an edict establishing a silver-dollar currency, with subsidiary coins as well, throughout the Empire. Whether the government is willing and able to give effect to this edict remains to be seen, but should it bring about this reform and establish a uniform currency throughout the empire, in place of the chaotic local system of weights of silver which now do duty for currency, the absorption of silver in that country should be greatly increased and the future prospects of this market improved thereby."

Gold—The price of gold on the open market in London has been unchanged at 77s. 9d. per oz. for bars and 76s. 5d. per oz. for American coin. No exports from New York are noted.

Platinum—Business is quiet and prices are unchanged. Dealers ask $30 per oz. for refined platinum and $35.50@36 per oz. for hard metal—platinum-iridium alloy.

Our Russian correspondent writes, under date of May 26, that the market is rather strong. The stocks from last year are nearly exhausted. At Ekaterinburg prices are unchanged at 6.30 rubles per zolotnik—$23.69 per oz.—for crude metal, 83 per cent. platinum. In St. Petersburg the same grade cannot be bought under 25,000 rubles per pood—$24.50 per oz.—with prospects of an advance.

Silver—Silver advanced to 24¾d. under orders from the Continent, but under the weight of spot silver, which seemed to be in supply above prompt requirements, the price has receded to 24½d. in London.

SILVER AND STERLING EXCHANGE

June.	2	3	4	6	7	8
New York....	53¾	53⅝	53½	53¾	53¼	53⅛
London	24⅜	24,	24⅝	24⅝	24,⁹⁄₁₆	24⅛
Sterling Ex..	4.8710	4.8650	4.8670	4.8665	4.8665	4.8650

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

It is rumored that the Granby Mining and Smelting Company will build new zinc-smelting works at East St. Louis.

The European zinc convention appears to be in difficulties over the question of allotment, which question has been the source of disruption of all previous spelter conventions.

Copper, Tin, Lead and Zinc

June.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. New York, Cts. per lb.	Lead. St. Louis, Cts. per lb.	Zinc. St. Louis, Cts. per lb.
2	12⅞ @13	12½ @12¾	56⅛	32⅞	4.32½ @4.37½	4.17½ @4.22½	5.02½ @5.05
3	12⅞ @13	12½ @12¾	56⅜	32¾	4.32½ @4.37½	4.17½ @4.22½	5.02½ @5.05
4	12⅞ @13	12½ @12¾	....	33	4.32½ @4.37½	4.17½ @4.22½	5.00 @5.02½
6	12⅞ @13	12½ @12¾	56⅛	33⅛	4.32½ @4.37½	4.17½ @4.22½	4.97½ @5.02½
7	12⅞ @13	12½ @12⅝	56⅞	33	4.32½ @4.37½	4.17½ @4.22½	4.97½ @5.00
8	12⅞ @13	12½ @12⅝	56⅜	32⅞	4.32½ @4.37½	4.17½ @4.22½	4.97½ @5.00

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

Copper—The market is quiet and little business is reported either for home trade or export. Prices are somewhat lower, and at the close Lake copper is quoted at 12⅞@13c.; electrolytic copper in cakes, wirebars and ingots at 12½@12⅝c. Casting copper is quoted nominally at 12¼@12⅜c. 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 14¼c base, carload lots at mill.

Transactions in the London standard market were small and prices have receded somewhat. At the close, spot is quoted at £56 7s. 6d., and three months at £57 2s. 6d. per ton.

Refined and manufactured sorts we quote: English tough, £59; best selected, £60@£60 10s.; strong sheets, £68@£69 per ton.

Exports of copper from New York for the week were 3240 long tons. Our special correspondent gives the exports from Baltimore at 431 tons.

Tin—The London market has been a dull affair during the week under review. Transactions were small and as no decided tendency developed, fluctuations amounted to but fractions. The close is cabled as weak at £148 17s. 6d. for spot and £150 2s. 6d. for three months.

Toward the end of last week some activity was instilled into the domestic market by liberal purchases on the part of the largest consumer. The purchases embraced near-by and future tin and caused a premium to be established again for spot material, which seems to be strongly held. Previous to these purchases there were sellers in the market at below the importation basis. The metal closes at about 32⅞ cents.

Lead—The market is quiet but firm, and at the close, St. Louis is quoted at 4.17½@4.22½c., and New York at 4.32½@4.37½ cents.

The London market for Spanish lead is somewhat firmer at £12 12s. 6d. and English lead is held for £12 15s. per ton.

Spelter—There is little demand. While consumers are not well covered, they continue to hold off, and the metal that has been offering for sale has not been readily absorbed. Prices have receded somewhat and at the close St. Louis is quoted at 4.97½@5c., and New York at 5.12½@5.15 cents.

New York quotations for spelter June 2-3 were 5.17½@5.20c.; June 4, 5.15@5.17½c.; June 6, 5.12½@5.17½c. June 7-8, 5.12½@5.15 cents.

The London market for good ordinaries is somewhat lower at £22 2s. 6d. and specials £22 7s. 6d. per ton.

Base price of zinc sheets is $7.50 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

Other Metals

Aluminum—The market continues firm, with good sales and many inquiries. Demand seems to be well up to the supply of the metal. We continue to quote 23¾c. per lb. for No. 1 ingots in large lots, New York delivery. The foreign market continues active, with prices firm.

Antimony—The market is reported still dull, and sales are only of a retail character. There is no change in current prices, which are given at 8⅜@8½c. per lb. for Cookson's; 7⅞@8c. for U. S.; 7⅜@7½c. for outside brands.

Quicksilver—Business is on a moderate scale, and prices are unchanged. New York quotations are $47 per flask of 75 lb. for large orders; $48@49 for jobbing lots. San Francisco, $46@46.50 for domestic orders and $2 less for export. The London price is £8 15s. per flask, with £8 13s. 9d. quoted by jobbers.

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

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

Cadmium—Current quotations are 65@70c. per lb. in 100-lb. lots at Cleveland, Ohio.

Imports and Exports of Metals

Exports and imports of metals in the United States, four months ended April 30, are reported as follows, in the measures usual in the trade:

Metals:	Exports.	Imports.	Excess.
Copper, long tons	87,136	49,814	Exp. 37,322
Copper, 1909....	88,895	49,260	Exp. 39,635
Tin, long tons....	165	18,092	Imp. 17,927
Tin, 1909.....	129	14,332	Imp. 14,203
Lead, short tons.	24,433	36,494	Imp. 12,061
Lead, 1909.....	29,592	35,413	Imp. 5,821
Spelter, sh. tons.	397	1,170	Imp. 773
Spelter, 1909....	1,894	1,064	Exp. 830
Nickel, lb.....	5,031,463	11,866,507	Imp. 6,835,044
Nickel, 1909....	3,653,202	6,255,032	Imp. 2,601,830
Antimony, lb.....	.....	3,192,360	Imp. 3,192,360
Antimony, 1909.	8,648	3,252,770	Imp. 3,244,122
Platinum, oz.....	... .	36,303	Imp. 36,303
Platinum, 1909.	..... .	40,015	Imp. 40,015
Quicksilver, lb...	88,327	.....	Exp. 88,327
Quicksilver, '09	143,268	.....	Exp. 143,268
Aluminum, value	$142,622	.....	Exp. $142,622
Aluminum, 1909	65,185	.....	Exp. 65,185
Ores, etc.:			
Zinc oxide, lb. ..	9,161,834	.....	Exp. 9,161,834
Zinc oxide, '09..	9,701,223	.....	Exp. 9,701,223
Zinc dross, lb....	2,011,989	.....	Exp. 2,011,989
Zinc dross, '09..	7,875,465	.....	Exp. 7,875,465
Zinc ores, lg. tons	8,431	23,349	Imp. 14,918
Zinc ores, 1909.	2,025	31,641	Imp. 29,616
Antim'y ores, lb.	.....	.....	.....
Ant. ores, 1909.	504	3,288,693	Imp. 3,288,189
Chrome ore, tons	20	12,726	Imp. 12,706
Chrome ore, '09	.....	15,272	Imp. 15,272

Copper, lead and nickel (and antimony from Aug. 5, 1909) include the metal contents of ores, matte, bullion, etc. The exports given include reëxports of foreign material. Zinc contents of ore imported in 1910 were 17,726,203 lb.; not reported prior to date of new tariff. Quantity of antimony ore is not reported this year, only metal contents being given. Exports of copper sulphate this year were equivalent to 689,353 lb. copper.

Zinc and Lead Ore Markets

Platteville, Wis., June 4—The highest price paid this week for zinc ore was $41.50; the base price, 60 per cent. zinc ore, was $41@42.50 per ton. The base price paid for 80 per cent. lead ore was $48 per ton.

SHIPMENTS, WEEK ENDED JUNE 4.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville.....	448,370	.....	333,300
Galena.....	314,120	.....	.....
Highland.....	256,300	.....	.....
Cuba City.....	254,955	.....	160,260
Shullsburg.....	125,000	.....	.....
Montfort.....	120,000	.....	.....
Total.....	1,518,745	.....	493,560
Year to date.....	35,798,656	2,651,689	7,700,280

In addition to the above there was shipped during the week to the separating plants, 3,501,428 lb. zinc concentrates.

Joplin, Mo., June 4—The highest price paid for zinc sulphide ore was $46, the base being $40@43.50 per ton of 60 per cent. zinc, in car lots. Zinc silicate sold as high as $28, on a base of $22@24 per ton of 40 per cent. zinc. The average price, all grades of zinc, was $38.92 per ton. Lead sold as high as $49 per ton, and some offers were declined at this figure. Owing to the refusal of holders to sell, the shipment of lead was reduced to the minimum of the year, with one exception. The average price, all grades of lead, was $48.64 per ton.

The zinc shipment was 885 tons less than last week, and the lead shipment,

242 tons less. The production was increased by the resumption of work by most of the mines shut down on account of strikes. All of the mills that were closed down on account of prices are still idle, awaiting a price of at least $45 per ton of 60 per cent. zinc before restarting.

SHIPMENTS, WEEK ENDED JUNE 4.

	Zinc, lb.	Lead lb.	Value.
Webb City-Carterville	2,886,260	385,210	$67,162
Joplin	1,929,220	331,590	49,036
Galena	1,142,770	64,370	25,000
Oronogo	861,010	46,530	19,125
Badger	772,660	.....	16,225
Alba-Neck	647,430	.....	14,242
Duenweg	649,760	92,950	13,937
Spurgeon	316,050	29,310	4,610
Quapaw	288,340	.....	4,428
Miami	409,070	8,760	4,299
Aurora	283,890	.....	3,560
Granby	204,010	5,170	3,115
Carthage	121,620	.....	2,614
Sarcoxie	117,390	.....	2,347
Saginaw	63,460	.....	862
Totals	10,642,940	963,790	$230,562
23 weeks	252,197,540	36,426,810	$6,034,742

Zinc value, the week, $207,120; 23 weeks, $5,080,004
Lead value, the week, 23,442; 23 weeks, 954,738

MONTHLY AVERAGE PRICES

Month.	Zinc Ore. Base Price.		Zinc Ore. All Ores.		Lead Ore. 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	.....	40.35	.....	57.52	.....
July	43.06	.....	41.11	.....	53.74	.....
August	48.25	.....	44.54	.....	57.60	.....
September	47.70	.....	44.87	.....	56.11	.....
October	49.50	.....	45.75	.....	55.02	.....
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.

CHEMICALS

New York, June 8—The general market is quiet, though a fair business is being done in most lines.

Nitrate of Soda—Business continues fair for the season, with prices unchanged, at 2.15c. per lb. for spot lots; 2.07½@21.2½c. for futures.

Messrs. Mortimer & Wisner, New York, report the position of nitrate in the United States on June 1 as follows, in long tons:

	1909.	1910.	Changes.
Stocks, Jan. 1	9,140	14,000	I. 4,860
Imports, 5 mos	134,450	192,580	I. 58,130
Total supplies	143,590	206,580	I. 62,990
Deliveries, 5 mos	143,340	197,980	I. 54,640
Stocks, June 1	250	8,600	I. 8,350
Afloat for U. S.	65,000	89,000	I. 24,000

Quantities afloat include all cargoes due to arrive at United States ports by Sept 15, next.

Copper Sulphate—Business is rather quiet, and prices are unchanged, at $4 per 100 lb. for carload lots and $4.25 per 100 lb. for smaller orders.

Arsenic—The market continues dull, and sales for the week were not over 50 tons. Prices are a shade lower, $2.30@2.40 per 100 lb. being quoted for white arsenic.

Imports and Exports—Imports and exports of chemicals and raw materials in the United States, four months ended April 30:

	Imports.	Exports.	Excess.
Copper sulph. lb.	.....	2,757,410	E. 2,757,410
Copper sul., '09	.....	1,873,866	E. 1,873,866
Bleach, lb.	32,954,122	.....	I. 32,954,122
Bleach, 1909	30,017,652	5,152	I. 30,012,500
Potash salts, lb.	231,481,630	1,939,363	I. 229,542,297
Potash salts, '09	117,442,260	1,469,219	I. 115,973,041
Soda salts, lb.	13,601,487	186,993	I. 13,414,494
Soda salts, 1909	4,676,542	236,720	I. 4,439,822
Acetate lime, lb.	.....	23,366,325	E. 23,366,325
Acetate, 1909	.....	32,306,476	E. 32,306,476
Nit. of soda, tons	195,689	2,490	I. 193,199
Nitrate, 1909	130,578	2,709	I. 127,869
Phosphates, tons	8,064	337,946	E. 329,882
Phosphates, '09	3,997	340,130	E. 336,133
Sulphur, tons	11,742	8,091	I. 3,651
Sulphur, 1909	10,606	9,030	I. 1,576
Pyrites, tons	235,499	.....	I. 235,499
Pyrites, 1909	223,913	.....	I. 223,913
Magnesite, lb.	87,649,914	1,621,742	I. 87,028,172
Magnesite, 1909	.....	.....	.....

Exports include reëxports of foreign material. Figures for magnesite not reported prior to July 1, 1909. Estimating sulphur contents of pyrites, the total imports of sulphur in 1910 were 105,942 tons.

MINING·STOCKS $

New York, June 8—The market opened after the holiday with a general break in all stocks and has been in the dumps nearly all the week. Prices quoted have been low and tending lower, with occasional little rallies on profit taking, but no permanent improvement. Today matters look much better and sharp advances are recorded.

Several sales of Homestake are noted, 350 shares changing hands at $85.50@86 per share.

The Curb followed the Exchange for the most part. Copper stocks were generally lower and depressed, with an uneasy tone. Sales were quite large, but quotations fell off considerably. The Cobalt stocks were the best part of the market, holding up well in price, and improving on several dividend declarations. The Nevada gold stocks were a little more active, but not strong.

Sales of securities at public auction in New York, June 2, included the following: 100 shares Tintic Company, $3 par, $100 for the lot; 100,000 shares Red Mountain Railroad, Mining and Smelting Company, $1 par, $50 for the lot; 400 shares Columbus & Hocking Coal and Iron Company, $100 par, $6.87½ per share; $25,000 Columbus & Hocking Coal and Iron Company collateral trust bonds, $9250 (37); agreement to deliver $5000 in first-mortgage bonds Canadian Bessemer Ore Company, $11 for the contract.

Boston, June 7—Although copper shares have been sympathetically weak, there has been no pressure owing to the thoroughly liquidated condition of the market. Several annual reports have issued during the week, prominent being that of the Lake Copper Company, Amalgamated and East Butte. Sentiment appears to be quite hopeful, but people are cautious and do not feel sanguine enough to take on fresh lines.

Lake Copper had an $8 drop to $44 but came back quickly to above $50. This company's stock list is a big one and shows a wide distribution of the stock.

Calumet & Hecla directors reduced the quarterly dividend rate from $8 to $7, and

COPPER PRODUCTION REPORTS.
Copper contents of blister copper, in pounds.

Company.	March.	April.	May.
Arizona, Ltd.	2,886,000	2,340,000	.....
Balaklala	1,263,733	1,109,311	.....
Boleo (Mexico)	2,148,383	2,777,800	.....
Copper Queen	10,809,488	9,920,000	.....
Calumet & Ariz.	2,820,000	2,400,000	.....
Cananea (Mexico)	3,700,000	4,262,000	.....
Detroit	1,698,975	1,930,000	.....
Imperial	825,000	800,000	.....
Nevada Con. (Est.)	5,339,466	5,500,000	5,500,000
Old Dominion	2,674,000	2,325,000	.....
Shannon	1,468,000	1,288,000	1,326,000
Superior & Pitts.	2,370,000	2,130,000	.....
Utah Copper Co.	7,853,288	7,902,643	.....
Butte District	24,000,000	25,000,000	27,000,000
Lake Superior	19,250,000	16,250,000	.....
Total production.	89,366,867	86 934,754	.....
Imports, bars, etc.	20,178,202	21,180,396	.....
Imp. in ore & matte	6,181,476	12,527,371	.....
Total	115,726,545	120,642,521	.....

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 from February includes the output of the Boston mill.

STATISTICS OF COPPER.

Month.	United States Product'n.	Deliveries, Domestic.	Deliveries for Export.
VI, 1909	116,567,493	60,591,116	70,966,457
VII	118,277,603	75,520,083	75,018,974
VIII	120,597,234	59,614,207	48,382,704
IX	118,023,139	52,105,955	50,077,777
X	124,657,709	66,359,617	56,261,238
XI	121,618,369	66,857,873	55,266,595
XII	117,828,655	69,519,501	59,546,570
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	62,944,818	40,585,767
IV	117,477,639	67,985,951	31.332,403
V	123,242,476	59,305,222	45,495,440

	Visible Stocks. United States.	Europe.	Total.
VI, 1909	169,848,141	127,352,960	297,201,101
VII	154,858,061	150,928,960	305,787,021
VIII	122,596,607	171,492,160	294,088,767
IX	135,196,930	197,993,600	333,190,530
X	151,472,772	210,224,000	361,696,772
XI	153,509,626	222,566,400	376,076,026
XII	153,003,527	236,857,600	389,861,127
I, 1910	141,766,111	244,204,800	385,970,911
II	98,463,339	248,236,800	346,700,139
III	107,187,992	254,150,400	361,338,392
IV	123,824,874	249,625,600	373,450,474
V	141,984,159	246,870,400	388,854,559
VI	160,425,973	239,142,400	399,568,373

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.

Osceola directors are expected to make a reduction from the $6 rate paid six months ago. Neither is a disturbing factor as both have been discounted. The declaration of an extra interim dividend of 5 per cent. by the Nipissing Mining Company had no effect on the market price of that issue. The stock has maintained a firm tone right along of late. Butte-Ballaklava has not held so strong as there has been more or less profit taking on the recent sharp advance. North Butte and Lake Copper were today's strong issues in sympathy with the abnormal overnight advance in Wall Street.

Curb trading has been restricted and prices rule lower. Ohio Copper, Chino and Inspiration have been the leading issues. The belief is now general that Davis-Daly stock will have to bear another assessment.

Assessments

Company.	Delinq.	Sale.	Amt.
Alameda, Ida.	June 10	July 2	$0.00½
Amador, Ida.	Feb. 24	June 30	0.01
Andes, Nev.	May 31	June 21	0.10
Beck Tunnel, Utah.	June 14	.....	0.01
Black Jack, Utah.	.....	.....	0.01
Blue Bell, Idaho.	Mar. 14	June 1	0.002
Brownstone, Utah.	Apr. 15	June 10	0.00½
Bullion, Nev	May 8	June 6	0.05
Caledonia, Nev.	June 17	July 8	0.10
Con. Virginia, Nev.	May 9	June 3	0.20
Crown Point, Nev.	June 26	July 20	0.10
Hancock Con., Mich.	Au.Oct.	.....	3.00
Helvetia, Ariz.	.....	.....	0.50
Hypothek, Ida.	May 14	June 14	0.00½
Mangus Dev., Mich.	May 7	.....	2.50
Mexican, Nev	May 17	June 9	0.15
Ojibway, Mich.	Oct.	.....	1.00
Reindeer, Ida.	May 31	Aug. 1	0.00½
Rhode Island Copper, Mich.	.....	.....	0.50
Sierra Nevada, Nev.	June 21	July 12	0.10
Union, Nev.	June 9	July 1	0.10
Utah Con. of Tintic, Utah	May 15	.....	0.01
Yellow Jacket, Nev	June 9	July 11	0.15

Monthly Average Prices of Metals

SILVER

Month.	New York.		London.	
	1909.	1910.	1909.	1910.
January	51.750	52.375	23.843	24.154
February	51.472	51.534	23.706	23.794
March	50.468	51.454	23.227	23.690
April	51.428	53.221	23.708	24.483
May	52.905	53.870	24.343	24.797
June	52.538	.....	24.166	.....
July	51.043	.....	23.519	.....
August	51.125	.....	23.588	.....
September	51.440	.....	23.743	.....
October	50.923	.....	23.502	.....
November	50.703	.....	23.351	.....
December	52.226	.....	24.030	.....
Total	51.502	.....	23.706	.....

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

COPPER.

	New York.				London.	
	Electrolytic		Lake.			
	1909.	1910.	1909.	1910.	1909.	1910.
January	13.893	13.620	14.280	13.870	61.198	60.923
February	12.949	13.332	13.295	13.719	57.688	59.388
March	12.387	13.255	12.826	13.586	56.231	59.214
April	12.56¼	12.733	12.93¾	13.091	57.363	57.238
May	12.893	12.550	13.238	12.885	59.338	56.313
June	13.214	.....	13.548	.....	59.627	.....
July	12.880	.....	13.363	.....	58.556	.....
August	13.007	.....	13.296	.....	59.393	.....
September	12.876	.....	13.210	.....	59.021	.....
October	12.700	.....	13.030	.....	57.551	.....
November	13.125	.....	13.354	.....	58.917	.....
December	13.298	.....	13.647	.....	59.906	.....
Year	12.982	.....	13.335	.....	58.732	.....

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling per long ton, standard copper.

TIN AT NEW YORK

Month.	1909.	1910.	Month.	1909.	1910.
January	28.060	32.700	July	29.125	.....
February	28.290	32.920	August	29.966	.....
March	28.727	32.403	September	30.293	.....
April	29.445	32.976	October	30.475	.....
May	29.225	33.125	November	30.859	.....
June	29.322	.....	December	32.913	.....
			Av. Year	29.725	.....

Prices are in cents per pound.

LEAD

Month.	New York.		St Louis.		London.	
	1909	1910.	1909.	1910.	1909.	1910.
January	4.175	4.700	4.025	4.582	13.113	13.650
February	4.018	4.613	3.868	4.445	13.313	13.328
March	3.986	4.459	3.835	4.307	13.438	13.063
April	4.168	4.376	4.051	4.225	13.297	12.641
May	4.287	4.315	4.214	4.164	13.225	12.550
June	4.350	.....	4.291	.....	13.031	.....
July	4.321	.....	4.188	.....	12.563	.....
August	4.363	.....	4.227	.....	12.475	.....
September	4.342	.....	4.215	.....	12.781	.....
October	4.341	.....	4.215	.....	13.175	.....
November	4.370	.....	4.252	.....	13.047	.....
December	4.550	.....	4.459	.....	13.125	.....
Year	4.273	.....	4.153	.....	13.049	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month.	New York.		St. Louis.		London.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	5.141	6.101	4.931	5.951	21.425	23.350
February	4.889	5.569	4.739	5.419	21.562	23.188
March	4.757	5.637	4.607	5.487	21.438	23.031
April	4.965	5.439	4.815	5.289	21.531	22.469
May	5.124	5.191	4.974	5.041	21.975	22.100
June	5.402	.....	5.252	.....	22.000	.....
July	5.402	.....	5.252	.....	21.969	.....
August	5.729	.....	5.579	.....	22.125	.....
September	5.796	.....	5.646	.....	22.906	.....
October	6.199	.....	6.043	.....	23.200	.....
November	6.381	.....	6.231	.....	23.188	.....
December	6.249	.....	6.099	.....	23.094	.....
Year	5.563	.....	5.352	.....	22.201	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PRICES OF PIG IRON AT PITTSBURG.

	Bessemer.		Basic.		No. 2 Foundry.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	$17.18	$19.90	$16.40	$17.98	$16.26	$17.94
February	16.73	18.96	16.09	17.21	15.90	17.38
March	16.40	18.53	15.84	16.93	15.62	17.00
April	15.79	18.28	15.05	16.84	15.06	16.75
May	15.77	17.10	15.02	15.94	15.08	16.18
June	16.13	.....	15.84	.....	15.63	.....
July	16.40	.....	15.90	.....	15.96	.....
August	17.16	.....	16.17	.....	16.20	.....
September	18.44	.....	16.80	.....	17.03	.....
October	19.75	.....	17.84	.....	18.02	.....
November	19.90	.....	18.37	.....	18.09	.....
December	19.90	.....	18.15	.....	17.90	.....
Year	$17.46	.....	$16.46	.....	$16.40	.....

STOCK QUOTATIONS

COLO. SPRINGS June 7

Name of Comp.	Bid.
Listed:	
Acacia	.06½
Cripple Cr'k Con.	.02
C. K. & N.	.17½
Doctor Jack Pot.	.10
Elkton Con.	.81
El Paso	.82½
Fannie Rawlins.	.05½
Findlay	.08½
Gold Dollar	.14
Gold Sovereign	.03½
Isabella	.19½
Mary McKinney.	.59
Pharmacist	.03½
Portland	1.20
Vindicator	.94
Work	.04
Unlisted:	
Golden Cycle	1.00
United Gold Mines	.08

SALT LAKE June 7

Name of Comp.	Clg.
Carisa	.45
Colorado Mining.	.60
Columbus Con.	.57
Daly Judge	3.50
Grand Central	1.25
Iron Blossom	.92
Little Bell	1.25
Little Chief	‡.45
Lower Mammoth.	.48
Mason Valley	7.00
Maj. Mines	.58
May Day	.05½
Nevada Hills	.80
New York	.13
Prince Con	.71
Red Warrior	‡6.00
Silver King Coal'n	2.47½
Sioux Con.	.19½
Uncle Sam	.36
Victoria	‡1.07½

SAN FRANCISCO. June 7.

Name of Comp.	Clg.
COMSTOCK STOCKS	
Atlanta	.11
Belcher	.70
Best & Belcher	.25
Caledonia	.47
Challenge Con.	‡.24
Chollar	.11
Confidence	.74
Con. Cal. & Va.	.96
Crown Point	.70
Exchequer	‡.21
Gould & Curry	.19
Hale & Norcross.	.32
Mexican	.95
Ophir	.75
Overman	.85
Potosi	.40
Savage	.20
Sierra Nevada	.19
Union	.19
Yellow Jacket	.75

Name of Comp.	Clg.
MISC. NEVADA	
Belmont	3.37½
Daisy	.07
Jim Butler	.28½
MacNamara	.27
Midway	.27
North Star	.05
West End Con.	.65
Atlanta	.11
Booth	.15
C.O.D. Con.	.09
Columbia Mt.	.07
Comb. Frac.	.51
Great Bend	.02
Jumbo Extension	.21
Oro	.05
Red Hill	.03
Sandstorm	.01
Silver Pick	.06
St. Ives	.11
Tramps Con.	.05½

N. Y. EXCH. June 7

Name of Comp.	Clg.
Amalgamated	67⅛
Am. Agri. Chem.	43
Am.Sm.&Ref.,com	77
Am. Sm. & Ref., pf.	103⅛
Anaconda	41⅜
Bethlehem Steel	‡27⅞
Col. & Hock. C. & I.	‡63⅛
Colo. Fuel & Iron.	34
Du Pont P'd'r, pf.	‡87½
Federal M. & S.	‡41
Great Nor., orectf.	58½
Nat'nalLead,com.	74¼
National Lead, pf.	‡107½
Nev. Consol.	20
Pittsburg Coal.	17⅛
RepublicI&S,com.	30
Republic I & S, pf.	93
SlossSheffi'd,com.	69½
Sloss Sheffield, pf.	‡117½
Tennessee Copper	25
Utah Copper	44⅞
U. S. Steel, com.	79
U. S. Steel, pf.	116
Va. Car. Chem.	59¾

N. Y. CURB June 7

Name of Comp.	Clg.
Bonanza Creek	3
Boston Copper	17
Braden Copper	4
B. C. Copper	5⅝
Buffalo Mines	‡2½
Butte Coalition	18¾
Caledonia	1¼
Chino	12
Cobalt Central	.10
Cobalt Prov.	59
Con. Ariz. Sm.	1¾
Cumberland Ely.	9
Davis-Daly	1⅜
Dominion Cop.	‡7
Ely Con	.56¼
El Rayo	3⅛
Florence	2.22
Gila Copper	5⅞
Giroux	7¼
Gold Hill	‡⅞
Goldfield Con.	8½
Greene Cananea	7¾
Guanajuato	‡1⅝
Guggen. Exp.	190
Kerr Lake	.08⅝
La Rose	4⅜
McKinley-Dar-Sa.	.96
Miami Copper	20⅜
Mines Co. of Am.	60
Mont. Shoshone	⅜
Mont.-Tonopah	‡.70
Nev. Utah M. & S.	1
Newhouse M. & S.	3½
Nipissing Mines.	11⅜
Ohio Copper	2⅛
Pacific Sm. & M.	⅜
Ray Central	2⅜
Silver Queen	.35
Standard Oil	621
Stewart	¼
Tonopah	8⅛
Tonopah Ex.	‡.90
Tri-Bullion	⅛
W. Va. Wyo. Cop.	‡2½
Yukon Gold	4⅜

LONDON June 8

Name of Com.	Clg.
Dolores.	£1 10s 0d
Stratton'sInd.	0 3 3
Camp Bird	1 8 0
Esperanza	2 12 6
Tomboy	0 18 9
El Oro	1 7 0
Oroville	0 8 0
Mexico Mines	8 11 3

BOSTON EXCH. June 8

Name of Comp.	Clg.
Adventure	‡6
Allouez	40
Am. Zinc	24½
Arcadian	5
Arizona Com.	16⅜
Atlantic	6¾
Boston Con.	‡17
Butte & Balak.	18¾
Calumet & Ariz.	61
Calumet & Hecla.	570
Centennial	16½
Con. Mercur	‡.10
Copper Range	64⅛
Daly-West	8
East Butte	8¼
Franklin	12
Granby	40
Hancock	18
Helvetia	3
Indiana	17½
Isle Royale	19⅝
Keweenaw	3½
Lake	5½
La Salle	12
Mass.	8⅛
Michigan	4⅜
Mohawk	50
Nevada	19¾
North Butte	32½
North Lake	11⅞
Ojibway	7
Old Dominion	35⅛
Osceola	135
Parrot	14
Quincy	74¾
Shannon	10½
Superior	42½
Superior & Bost.	10¾
Superior & Pitts.	11⅜
Tamarack	50
Trinity	5½
U. S. Smg. & Ref.	41¼
U.S.Sm. & Re., pd.	49⅜
Utah Apex	3
Utah Con.	21
Victoria	3
Winona	7¼
Wolverine	112
Wyandotte	1½

BOSTON CURB June 7

Name of Comp.	Clg.
Ahmeek	165
Bingham Mines.	3
Boston Ely.	2
Boswyocolo.	.08
Cactus	2⅞
Calaveras	5⅛
Champion	.05
Chemung	8
Chief Cons.	1⅜
Cons. Ariz.	2
Corbin	.06¾
Crown Reserve	3
First Nat. Cop.	3⅝
Indiana	17½
Inspiration	7⅛
Mackinaw	.06
Majestic	.58
Nat'l Mine	.27
Nevada-Douglas.	2⅜
New Baltic	6¾
Oneco	3
Raven Copper	42
Ray Con.	17
Rhode Island Coal	7
San Antonio	7⅛
Shattuck-Ariz.	25
South Lake	5
Superior & Globe.	.38
Trethewey	1⅜
Tuolumne Copper	3¼
Vulture	9
Yuma	.50

‡Last quotation.