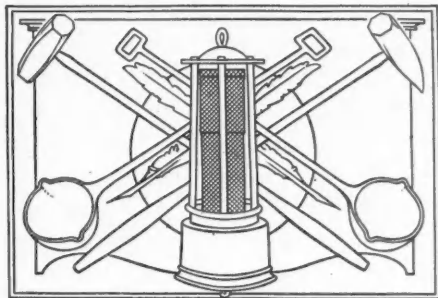


# THE ENGINEERING AND MINING JOURNAL

PUBLISHED WEEKLY

By the Hill Publishing Company, 505 Pearl Street, New York :-: John A. Hill, president; Robert Mc Kean, secretary :-: Subscriptions payable in advance, \$5.00 a year for 52 numbers, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii, or the Philippines, \$6.50 in Canada :-: To foreign countries, including postage,



\$8.00 or its equivalent, 33 shillings: 33 marks: or 40 francs :-: Notice to discontinue should be written to the New York Office in every instance :-: Advertising copy should reach New York Office by Thursday of week before date of issue :-: Entered at New York Post Office as mail matter of the second class.

VOL. 89

APRIL 30, 1910.

NO. 18

### CIRCULATION STATEMENT

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

Our circulation for March, 1910, was 39,500 copies.

April 2.....	11,000
April 9.....	9,500
April 16.....	9,500
April 23.....	9,500
April 30.....	9,500

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

Contents	PAGE
Editorials:	
Some Matters of Copper History.....	899
Lake Superior Ore Shipments.....	900
Connellsville Coke Production.....	900
Correspondence and Discussion:	
The Census Report on Mines and Mining.....	E. W. Parker 901
Experts and California Oil.....	Robert Anderson 901
McKittrick-Sunset Oil Region, California.....	902
Ownership of Utah Copper Company.....	902
Grass Valley Mining District.....	R. E. Tremoureaux 902
Barytes in the United States.....	902
Judge Gary on the Steel Trade.....	903
Dry Land Dredge.....	903
Details of Practical Mining:	
*A Cheap and Durable Cable Tower.....	H. S. Reed, Jr. 904
The Economic Limit of Concentration.....	904
*Slag Handling Arrangement at British Columbia Copper Company.....	904
Smooth Lining for Tube Mills.....	905
*Useful Knots for Engineers.—IV.....	A. Livingstone Oke 906
*Safety Stops on Guide Timbers.....	907
*Tram Car Tipple.....	Guy C. Stolz 907
Dredging Operations of Natomas Consolidated.....	Special Correspondence 908
Report of Nipissing Mines Company.....	908
Fifth Annual Report of Utah Copper Company.....	909
Old Dominion and Subsidiary Companies.....	910
Alaska United Gold Mining Company.....	910
*The Black Range Mining District, New Mexico.....	Martin Fishback 911
Report of Iron Silver Mining Company.....	912
*Oil Flotation Process at Broken Hill, N. S. W.....	Theodore J. Hoover 913
*The Quarries of the Canadian Asbestos District.....	Fritz Cirkel 918
Metal Production of Upper Silesia in 1908.....	Special Correspondence 920
Piedras Verdes Disseminated-Copper Zone.....	S. L. Pearce 920
Héroult Furnace Licensees in America.....	920
*The Petroleum Fields of the United States.....	W. G. Burroughs 921
Treatment of Antimony Ores Containing Arsenic.....	924
A Suggestion to the Coal Mining Industry.....	T. B. Bancroft 925
Utilization of By-Product Gases from Coke Ovens.....	Henry M. Payne 927
Explosions in Coal Mines.....	928
Colorado Coal Mines to Open with Non-union Labor.....	Special Correspondence 929
Colliery Notes.....	929
Questions and Answers.....	930
Personal, Obituary and Societies.....	931
Editorial Correspondence.....	932
Mining News.....	935
Markets.....	940
*Illustrated.	

## Some Matters of Copper History

There is nothing new under the sun; not even a great accumulation of copper, an enormous production, and forebodings that it will outrun all possibilities of consumption at remunerative prices. The following is the first paragraph of the article on copper in THE MINERAL INDUSTRY, Vol. 1, reviewing conditions in 1891:

"The production of copper in the United States has increased each year, almost without an exception, since the commencement of the industry, and in recent years at a rate which has brought it not only above that of any other country but has made it equal in amount to the aggregate product of all the rest of the world. It is not surprising that the copper markets of Europe should look with amazement, the copper mines of the world with anxious forebodings, and the mining and metallurgical professions with unbounded admiration at this marvelous growth, and perhaps, still more at the figures of cost, which, despite high wages, high values of supplies, and transportation for thousands of miles to the nearest seaport, have enabled us to control the markets of the world and have almost placed upon the ragged edge of bankruptcy the copper mines of the older producing countries. It is not unnatural that those who have watched from a critical position the rising of the tide of this great stream and the ever increasing flow from the sources which supply it, should have feared a coming "deluge" of the metal. They overlooked, however, the facts that though the volume of the torrent easily carried away

all artificial dams and obstructions in its course, and drowned out the little surface springs along its route, it spread its fertilizing flood over the desert and created such new uses and rapidly increasing demands that even its vast and growing volume could scarcely supply. The known sources are not inexhaustible; the stream may, yes, it will increase, but the area its very abundant floods have fertilized already absorbs the whole and calls for more. There can be no deluge now or hereafter, but there may be a drought and a famine."

That the present accumulation of copper and its gradual distribution are not without precedent are manifest from the examination of previous records. When the Secretan syndicate collapsed in 1889 the world's visible supply of copper was about 175,000 metric tons. The production in that year was 265,516 metric tons, the accumulation being equivalent to eight months' output. But the price for copper, which fell from 17¼c. to 11c. (monthly averages) recovered to nearly 17c. in a little less than a year.

Again, in 1901, when the Amalgamated umbrella was blown inside out, the accumulation of copper rose to 150,000 tons. The production in 1901 was 529,508 tons. Consequently, the accumulation was nearly 3½ months' supply. The price falling from 16½c. to 11c. rose to 14½c. before the end of 1904.

The present accumulation of copper is about 170,000 tons. The world's production in 1909 was about 840,000 tons. The accumulation is, consequently, less than 2½ months' production. If it were less than one month's production the situation of the market would be unsafe.

Both in 1889 and in 1901, the most dangerous element of the situation was the fact that the bulk of the accumulation was held in a single hand; by the Secretan syndicate in 1889 and by the Amalgamated in 1901. The Secretan stock was taken over by bankers who carried it for several years pending ultimate distribution, during which time the copper producers pursued an even tenor of way. After the Amalgamated collapsed, it was only a few years before we had a copper famine.

There is no particular lesson to be drawn from the above figures except that the present situation is not without precedent. It is always more important to forecast the future than to review the past. It seems to us that the production, which increased so largely in 1909, has reached a climax for the moment, while consumption is continuing to increase. The new production, whereof such gloomy view is taken, will not materialize so soon as anticipated. Miami will begin to produce early in 1911. Ray and Braden are further behind. Chino still further. The other new porphyry mines do not command immediate attention. There will be no metal from Copper River before summer of 1911. The flood of copper promised from Katanga need not worry anyone. Copper exists there, but probably it will come in dribbles.

Both Calumet & Hecla and Copper Queen have large potentiality for increased production, but their policy seems distinctly in the direction of restraint except when metal price is high—sound business policy. Utah Copper Company will doubtless increase largely, but not much before middle of 1911. The big porphyry mines once started cannot very well curtail.

On the other hand, old mines like North Butte, Granby, and Highland Boy are nearing the end of their life. Even Butte will not live forever. So there is subtraction to be figured as well as addition.

It looks as if the absorption of the present accumulation would depend upon the extent to which consumption gains during the next 12 months. The indication is that it will continue to forge ahead. This does not mean, however, that any great rise in the price for copper is to be expected, but we may during the next 12 months have  $13\frac{1}{2}@14c.$ , with which producers ought to be satisfied.

### Lake Superior Ore Shipments

The Lake shipping season has opened and iron-ore traffic is in full course, nearly three weeks earlier than last year. The mines of the Lake Superior region have been put in shape for a production and shipment of 50,000,000 tons of iron ore this season, if it is required. From present appearances, however, it is hardly probable that so great an output will be made; nor that they will reach the 42,500,000 tons of 1909. Not that there is likely to be any decided break, but the demand from the furnaces for ore is less pressing than was anticipated early in the year. Ore is not being rushed, as might have been the case if furnace capacity was fully taken up. The event has proved that the present capacity has gone beyond present needs, and the result will be a number of idle stacks for some months to come, until consumption has a chance to work up. It will do so in time, but not with a rush; and ore supply will have to be kept down to the demand.

The Mesabi range will, of course, be the largest shipper as it has been for several years. Its production can be more easily regulated, and its ores can be mined for the most part at a little lower cost than those of the other ranges. For this reason its fluctuations are not so extreme as those of the other ranges.

Upon the whole, it looks as if this season would see shipments well up to the average of several years past, but a "record" is hardly to be expected.

### Connellsville Coke Production

A sharp and sudden drop in the production of Connellsville coke is one of the signs of the present condition of the iron trade. To some extent it had been presaged by a continuous decline in selling prices which has now extended over two months, and by an absence of demand for coke over the regular contract deliveries. In January the weekly average of production in the region was 464,293 tons; increasing a little in February to 466,461 tons, it dropped a little in March to 461,072 tons. For the week ended April 9 the reported output was 447,508 tons, but in the following week, April 16, it fell sharply to 338,374 tons. This indicated that nearly one-fourth of the coke ovens were out of commission.

There had been some talk previously of a curtailment of production, but no general agreement had been made. The present reduction, apparently, was made chiefly by the H. C. Frick Company, the coke subsidiary of the Steel Corporation, and rather took the independents by surprise. In part it is held to be the forerunner of the blowing out of several of the corporation furnaces; but it may be in part also due to the fact that the corporation has been piling up stocks of coke, and may not consider it wise to continue the accumulation. A third cause may be that some Connellsville coal may be needed by the corporation's plants in case of a continuance of the present deadlock between the miners and operators of the Pittsburg district.

So large and sudden a drop in coke production has never before occurred, and it could only result from the action of the largest producer; especially as there was no evidence of concerted action among the independents.

The report of the Utah Consolidated Mining Company for 1909 gives some interesting information respecting the salvage of a smelting works upon dismantlement. The cost of this company's plant was \$972,676. The structural steel sold to the International Smelting and Refining Company has realized \$72,047, while machinery and plant have brought \$92,473. There is estimated to remain property valued at \$15,000, not yet realized. Against these credits is the wrecking expense, amounting to \$37,350. The net salvage in this case appears to amount to a little more than 14 per cent., which appears to be unusually high and is, of course, explainable by the fact that the material and machinery of the old plant could be employed for a new plant being erected in the same district, in which the Utah Consolidated is financially interested, this being a condition that does not ordinarily occur.

In its report for the year ended Dec. 31, 1909, the Utah Copper Company has for the first time stated the tonnage of ore mined, the figure for 1909 having been 2,674,271 tons. In the JOURNAL of Apr. 2, we discussed the statement made by this company to the New York Stock Exchange, and estimated the tonnage at 2,600,000. Consequently our deductions as to the cost of mining, milling, etc., were very close to the actual results.

# CORRESPONDENCE and DISCUSSION

Views, Suggestions  
and Experiences of Readers

## The Census Report on Mines and Mining

The statements in the editorial of the JOURNAL of April 9 are unwarranted and erroneous.

The first misstatement is that the Geological Survey mixed into the business. The Geological Survey did not take any initiative in regard to the mining census. The proposition of coöperation came from the Census Office, and as a result of numerous conferences, a scheme of coöperation between the two bureaus was agreed upon by the two directors and received the approval of the secretaries of the two departments.

The second misstatement is that according to well authenticated reports the arrangement between the Bureau of the Census and the Geological Survey is not working altogether satisfactorily. This is not true. There is entire harmony between the officials of the Bureau of the Census and the Geological Survey, and there has been no friction whatsoever. It is also untrue that the "inspection of the returns, so far received, has convinced some of those in charge that the results are wholly unreliable for the anthracite and bituminous coal regions, so much so that it is now understood that there is in contemplation a retaking of the anthracite census." There cannot be a retaking of the census when the census has not been taken. The work has only begun in the anthracite region, and up to date, only a few schedules have been received; these, so far as the Geological Survey is concerned, being entirely satisfactory. It is not true that the bituminous reports are even in worse shape. I have been agreeably surprised by the complete and correct manner in which the schedules are turned into the Geological Survey, and the amount of editing and correction necessary has been practically *nil*.

It is not true that the essential difficulty has been found in the fact that "some of the questions asked in the schedules are incapable of intelligent answers." All of the questions on the schedule returned to the Geological Survey have been intelligently answered. It may be that in some cases "the cost of labor reported has exceeded the value of the finished product," but there are some cases, particularly when exploitation and development work is in progress, where the labor cost exceeds the value of the product.

In such an undertaking as a census

of mining and manufactures, it is natural that there should be some cases where the replies to inquiries need amendment or explanation, but the experience in taking the Thirteenth Census has thus far been that less difficulty in this regard has been encountered than has been the case in any previous census.

E. W. PARKER.

Statistician in Charge, U. S. Geological Survey, Washington, D. C., April 18, 1910.

[Besides the letter from Mr. Parker, we have received one from Dr. Durand, director of the Census, to the effect that the census investigation as to mines and quarries is proceeding satisfactorily. We are pleased to hear this and sincerely hope that the result of the work for 1910 will be better than that of 1905, which was poor. We are glad to hear, moreover, that harmony exists between the Census Bureau and the Geological Survey, and that both are pleased with the returns so far received. In spite of these official statements, however, we do not repudiate our own information. If the Census schedules do not discriminate between the labor of coal extraction and that of dead work they ought to.

Our remark that the Geological Survey had mixed into the census business was based upon a statement to us by a responsible official of the census. Of course, he did not employ just that phraseology, but he *did* say that certain parts of certain schedules were incorporated at the request of the Geological Survey and therefore could not be discussed insofar as the Census Bureau was concerned, and we knew the inquiries to be unwise.

Our previous remarks were based upon the opinion that the census of 1905 was a very poor affair, from the mining and metallurgical standpoint, and the prospect that the census of 1910 would be no great improvement, it being conducted, to a large extent, by the same methods and under the same officials of the Census Bureau. In some of the cases that we have investigated, we say that the methods are not good.

In connection with our previous remarks, we are not to be interpreted as suggesting that there is any opposition on the part of anthracite and bituminous coal miners to furnish the information required. We have not heard of anything of that kind, and we urge the operators of all mines to fill out the schedules promptly and to the best of their ability.—EDITOR.]

## Experts and the Productive Area of California Oil Fields

In the JOURNAL of March 26, attention is called to the great gusher of the Mays Oil Company, which recently "came in" in the Midway field of California. It is noteworthy that about the middle of March, shortly after the completion of the Mays well, another phenomenal fountain of oil rose about ten miles farther southeast in the Lakeview well of the Sunset field. During the first month of the life of this well it is said to have produced the extraordinary daily average of from 30,000 to 40,000 bbl. of oil. It thus takes rank as the greatest gusher of the Pacific coast, and assumes a place among the most productive oil wells that have been known.

Some statements made by your correspondent in the issue of March 26 call for correction. He states that "in the Coalinga field, the Coalinga-Mohawk Company has brought in a 4000-bbl. well . . . where geologists and oil experts did not expect oil could be found." Whether or not this statement applies to the "experts" who have reported on the territory I cannot say, but I question whether your correspondent knows of any geologists who have held the opinion which he ascribes to them. This locality was included well within the area of the probable productive territory and was specifically mentioned as favorable ground in the report on the Coalinga district (*Bull.* 357) published by the U. S. Geological Survey in 1908. It may be noted, likewise, that the Mays and Lakeview wells above mentioned are situated on hitherto unproved ground, mapped and described as offering good chances for the discovery of oil, in the McKittrick-Sunset report of the Survey (*Bull.* 406.), which is just coming from the press, and the proof of which was read some months since.

Your correspondent further says that the Midway field is the most productive in the State. As a matter of fact, its output in 1909 was less than one-sixth of the amount of oil produced in the Coalinga district, the banner district of California, and ranked seventh in production among the districts of the State. Its present output may have brought it up to fifth place.

ROBERT ANDERSON.

Assistant Geologist, U. S. Geological Survey.

Washington, D. C., April 20, 1910.

## McKittrick-Sunset Oil Region, California

California now stands first among the States in production of petroleum, which is its most valuable mineral product, gold at last ranking second. This enormous production has naturally attracted general attention to the oilfields of the State, which are now being actively exploited. A report<sup>1</sup> on the McKittrick-Sunset oil region, in western Kern and eastern San Luis Obispo counties, has been prepared by Ralph Arnold and H. R. Johnson. The region covered embraces about 1800 square miles and includes the most productive territory of the McKittrick, Midway and Sunset fields and the undeveloped or less developed Devils Den, Temblor, and Carrizo Plain districts. Large areas of public lands in this region have been withdrawn from entry pending legislation or reclassification. The McKittrick field produced 2,517,951 bbl. of oil in 1908, the Midway field produced 410,000 bbl., and the Sunset, 1,556,263 bbl. Some single wells in this region have yielded more than 2500 bbl. a day. The oil is dark and heavy, has an asphalt base, and has been used principally as fuel on railroads, as road dressing, and for refining for asphalt.

### CHARACTER OF THE REPORT

The report gives an account of the geography, topography, and general features of the region, sketches the geology, includes notes on the water supply, and describes the oil-bearing strata and the wells in detail. It includes many logs of wells, lists of companies and wells, giving location, elevation and other features, statements of production of wells and character of oil, and notes on methods of drilling, especially with a view to shutting off water. A section on the future development of the region states the probabilities of getting oil in areas not yet exploited.

## Platinum, Palladium and Iridium

A correspondent communicates the following review of the market for platinum and allied metals: "Platinum has been steadily advancing since last September, and today is worth fully \$5 per oz. more than during the latter part of 1909. In small lots, ingot metal cannot be bought for less than \$29 per oz., but in large lots it is obtainable at \$28.50@28.75. Advices from abroad indicate that the price for this metal will continue to advance for some time to come.

"Palladium can be purchased at \$31@32 per oz., but iridium is simply 'out of sight.' There is very little of this metal on the market, and for what can be had

as high as \$50 per oz. must be paid. The holders do not seem to be particularly anxious to part with it even at that figure. Iridium has never been sought for to any great extent until during the last year, when the electrical concerns and automobile manufacturers began using it for sparking points. Jewelers are also using large quantities of it for the setting of precious stones."

## Ownership of Utah Copper Company

In the following list are given the names of the largest stockholders of Utah Copper Company, as shown on the company's lists at the annual meeting on April 22:

Holder.	Shares.
Guggenheim Ex. Co.	401,433
S. R. Guggenheim	28,666
Daniel Guggenheim	23,150
Murray Guggenheim	21,898
Isaac Guggenheim	10,500
Isaac Guggenheim	38
Carrie Guggenheim	888
Irene R. Guggenheim	94
E. & G. Guggenheim	23
Wm. J. Yates	174,505
Hayden, Stone & Co.	109,567
Samuel Hayden	40
Spencer Penrose	52,060
Boies Penrose	4,986
Chas. B. Penrose	4,986
Lydia S. Penrose	577
Mary Penrose	190
Clement B. Penrose	100
Julia V. L. Penrose	100
C. M. MacNeill	34,194
D. C. Jackling	11,368
Henry M. Blackmer	400
Judd Stewart	50
Edward Brush	2,300
Jos. Clendenin	2,006
S. W. Eccles	10
T. E. Fell	7,800
W. Hinkle Smith	8,888
W. B. Thompson	101
Alvin Untermeyer	12,664
Isaac Untermeyer	586
Charles L. Tutt	5,000
William Crawford	3,788
Richard Delafield	1,422
Andrew Freedman	1,000
Bkrs. Tr. Co., trustee	3,836
Darr & Moore	341
R. L. Day & Co.	1,116
De Coppet & Co.	92
De Cop. & Doremus	173
Dominick & Dominick	919
Baruch Bros.	5,014
Aug. Belmont & Co.	4,000
Farson, Son & Co.	960
Flower & Co.	885
H. P. Goldschmidt Co.	6,074
Halle & Stieglitz	6,920
Kanawha Inv. Co.	5,097
Ladenburg, Thalman & Co.	7,278
W. E. Lauer & Co.	26,454
Lee, Higginson & Co.	459
Eugene Meyer & Co.	46,149
Eugene Meyer, Jr.	10
Paine, Webber & Co.	4,277
Sutro Bros. & Co.	2,220
Spencer Trask & Co.	1,575
Lehman Bros.	10,240
H. P. Whitney, executor estate Wm. C. Whitney	15,188
H. P. Whitney	7,833
Cornelius Vanderbilt	488
Henry T. Graf	10,558
F. C. Druding	11,000
James G. Lynch	7,950
Louis Marshall	5,400
J. G. Hopkins	5,000

The stock in the name of William J. Yates is supposed to be the property of the Guggenheim interests. W. B. Thompson appears as holding only 101 shares, but he is supposed to be one of the heaviest stockholders, the bulk of his stock being presumably registered elsewhere under a different name. Utah Copper Company has about 2500 shareholders.

## Grass Valley Mining District

BY R. E. TREMOUREUX\*

With seven stamp mills running regularly and three more to start within a short time, the Grass Valley mining district situated in Nevada county, Cal., has made a favorable beginning for 1910. The North Star mine leads the State as a gold producer, \$300,000 having been cleaned up during the first three months of this year. The shaft is down 5400 ft. on the vein and most of the ore comes from below 3000 ft. Two 40-stamp mills with cyanide plants handle about 8000 tons of ore per month.

The Empire mine ranks second in Nevada county and is one of the largest producers in the State. The accounts are not made public but it is thought the bullion shipments closely rival the North Star. The shaft is now down 3750 ft. on the vein and sinking is to be continued for the next two years. A 40-stamp mill handles the ore. The tailings are now run over a canvas plant, but the company contemplates erecting a cyanide plant in the near future.

The Pennsylvania and W. Y. O. D. are now worked under the same management and the 20-stamp Pennsylvania mill is running but the W. Y. O. D. mill has been closed for two years. About 70 men are employed, mostly on development work.

The Sultana's 20-stamp mill is dropping on good ore with over 60 men employed. The Union Hill runs 10 stamps and employs about 40 men. The Idaho-Maryland, once the greatest mine in the district, is now only working in the upper levels where sufficient good ore is encountered to keep a 20-stamp mill running.

The Brunswick has started a new vertical shaft which is expected to strike the vein at a depth of 1050 ft. Work on a new hoist is also being carried on rapidly. There are several smaller properties which are developing and sinking. The Norambague and the Ben Franklin are the most important of these.

Two gravel mines are working; the Jenny Lind and the Posey Cañon. Both of these mines have channels 250 ft. wide and at places, a depth of 8 ft. in good paying gravel.

## Barytes in the United States

According to statistics compiled for THE MINERAL INDUSTRY, the production of barytes in the United States for 1909 was 39,831 tons, valued at the mines at \$138,634. Of this amount, 28,127 tons came from the southeast Missouri district. North Carolina produced about 8000 tons.

\*Grass Valley, Cal.

<sup>1</sup>Bull. 406, U. S. Geol. Survey.

## Judge Gary on the Steel Trade

At the recent meeting of the Steel Corporation, Judge Gary made the following remarks:

"I have no objection to saying that we have no reason to anticipate trouble from any source, nor any reason to suppose that our business prospects will be any poorer than they are at the present time. Of course, naturally, from time to time, we encounter more or less difficulty in keeping our mills running to their full capacity and in receiving prices which we think are adequate and reasonable. But our effort all the time is to do our business in such a way that one cannot reasonably be criticized by anyone who is interested in our affairs—criticized by the stockholders, by the employees, by our customers, by our competitors or by the general public. We believe that in the long run if we transact business in that way and at the same time keep the public fully advised from time to time in regard to our affairs, we will receive such treatment as we deserve.

"Of course, when general business conditions are good we prosper more, and when they are not so good, we prosper less. That may not be as applicable to our business as to the business of some others, for the reason that we think we have some advantages in regard to cost of production and cost of deliveries. But that we are more or less affected by general business conditions goes without saying. Therefore, you can tell something about what our business must be and what our prospects are when you consider what general conditions are and what you think they will be.

"We had a very serious depression following the panic of 1907; but during the year 1908, as you all know, notwithstanding all the difficulties surrounding us, we were fairly prosperous. You know by our recent annual report for 1909 that we were much more prosperous during that year. At the present time our mills are running to practically their capacity, and some of them are considerably behind in shipping up to the requirements of the trade. That we may have some reactions during the year is possible, but we have nothing in sight at the present time to indicate that our business during the whole of this year will not be very good and entirely satisfactory.

"At the time the United States Steel Corporation was organized, we had a capacity of about 25,000 tons per day; at the present time we have a capacity of about 42,000 tons per day; and our manufacturing capacity has been increased by investments made from our earnings. So you will see from the statement I have made that our opportunities for success are much greater at the present time than they were when we were organized. Moreover, since we were organized, we

have spent large sums of money in the acquisition of additional raw products, which are scarce and growing scarcer, and also in the improvement of our facilities by the introduction of new methods, new machinery, labor-saving devices and the installation of the most modern methods of manufacturing at a low cost.

"It would not be seemly to boast of our position or of our prospects, but we believe we are well secured against trouble in the future from any direction. The stockholders of our corporation have the opportunity at any time of securing information which is proper for them to receive. We have in our company no officials who receive advance information and profit by that information."

## American Institute of Mining Engineers

A circular from the secretary's office announces that the proposed excursion to Japan has been postponed, owing to difficulties in the arrangement of details. The Council has authorized a meeting to be held in the autumn in the Panama Canal Zone. Cordial letters have been received from the President of the United States and from Colonel Goethals, engineer in charge. Concerning this meeting, the following preliminary statement is offered:

The party will leave New York about the beginning of November; the trip will occupy between three and four weeks; and the cost to each passenger will be about \$200, covering hotel expenses and transportation on the isthmus.

Besides the trip to and from the isthmus, it is proposed to include, among other possible stops *en route*, a visit to the mines and works of the Spanish Iron Company, on the north shore of Cuba. It is probable that other points, such as Havana, Kingston, etc., will be touched.

According to present information, the number of members and guests (including ladies) who can be transported at the rate stated above is 150. This number can be accommodated upon one of the regular Hamburg-American steamers, if ample notice be given in advance to secure reserved rooms.

Members are requested to indicate their intention concerning the Canal Zone meeting. To those replying in the affirmative special circulars will be subsequently sent concerning all necessary details; and, if the number of members and guests thus indicated should exceed 150 (without amounting to an aggregate so large as to require an entirely new arrangement), the following order of preference will be observed. (a) Members in the order of the date of their applications up to May 15. (b) After May 15, guests accompanying members, in the order of the date of application prior to May 15, one guest for each member having preference, and a second or third

guest being accepted only in case there is still room on May 15. (c) After May 15, both members and guests must take their chance in the order of their applications.

## Potash Salts Supplies

The new organization of the German Kali-Syndikat has been formally incorporated. It is stipulated that the companies holding American contracts can come in provided they terminate those contracts at the end of a year. If they decline to do so, a new syndicate will be formed.

The London correspondent of the *American Fertilizer* writes: "Until lately it has been believed that Germany was the only country in the world in which deposits of potassium salts existed. Now, however, the news of the discovery of potassium deposits in other countries is announced in the German press. According to the Brunswick *Landes-Zeitung*, the latest German discoveries are in Alsace, close to the French boundary, and the potassium deposits there will probably extend across into France, as has been the case with the salt deposits. It has also been established that deposits occur in Hungary, Russia, Holland and Persia. It is further announced that potassium salts have been found in China. Although the fact has been known for some time, it has been kept a secret, and the whereabouts of the deposits has not been disclosed. Samples of these Chinese salts have been tested by a chemist connected with the Potassium Syndicate, and the results have shown a large percentage of chloride of potassium."

## Dry Land Dredge

SPECIAL CORRESPONDENCE

By the incorporation of the Western Gold Dredging Company, at Oroville, Cal., with a capital stock of \$100,000, plans for opening up an entirely new field in gold dredging are revealed. The company has taken a lease on 35 acres of ground at Thompson flat, near Oroville. The new dredge is described as a dry-land steam-shovel dredge and will work ground to the depth of 6 ft. only. It consists of a steam shovel on traction-engine wheels so that it may easily be moved about. Attached to the steam shovel as a trailer is a sluice car on which are sluice boxes in which the gravel will be washed. It is claimed that this apparatus will leave the land in suitable condition for farming purposes after the gold is extracted. There is undoubtedly a large area of shallow gravel land that cannot be worked by the regular dredges and if this new method is successful, it will have a wide field.

A dry-land dredge is said to be operating on the P. R. Welch place, near Oroville.

# 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

## A Cheap and Durable Cable Tower

BY H. S. REED, JR.\*

The cable tower shown in the accompanying photograph was designed to meet conditions of unskilled labor and high cost of material. Three of these towers have been in use at Mina La Gloria, Batopilas, Mexico, nearly a year with satisfactory results.

To make the joint at the top five cuts are necessary, but as they are all equal when one is laid out the workman has but



MEXICAN CABLE-WAY TOWER

to use it as a pattern for cutting the others. The cross piece is bolted flat to the two back legs by  $\frac{7}{8}$ -in. bolts and is notched only sufficiently to give a seat for the front leg to which it is also bolted by a  $\frac{7}{8}$ -in. bolt.

### ERECTION

In erecting, the two back legs are bolted firmly together by a  $\frac{3}{4}$ -in. bolt and the  $\frac{3}{4}$ -in. U bolt put in loosely, then when the back legs are raised to a perpendicular position the front leg is inserted and the three legs spread and settled into position and tied together at the bottoms by small poles bolted to each leg. The carpenter now climbs up the steps,

\*Mina La Gloria, Batopilas, Chihuahua, Mexico.

and tightens the U-bolt, at the same time putting in another  $\frac{3}{4}$ -in. bolt at right angles to the first bolt in the back legs.

After the bottoms of the legs are each placed on a large flat rock and the whole securely anchored by piling rocks on the tie pieces, the cross piece is raised and placed level, where it is held temporarily by boards nailed across from leg to leg while it is bored and bolted. Of the two uprights only one, that on the loaded side, is needed. The legs are 6x8 in. x5 m. long, rough hewn, being the way the Indians bring them from the mountains, and cost two pesos each. The cross piece is 9x9 in., also rough hewn. The ties at the bottom, *morillos* as they are called, are about 5 in. in diameter at the butt and from 4 to 5 m. long. The cable used is 1400 m. long and is  $\frac{7}{8}$  in. in diameter. It has a capacity of 60 tons per day, each bucket holding 80 kg. when filled.

## The Economic Limit of Concentration

A discussion of William Poole's paper on ore treatment brought out many interesting features at the October meeting of the North Queensland Mining and Mill Manager's Association at Charters Towers. Possibly the most interesting and novel problem discussed was, "Will it pay to concentrate ores so carefully that their value will be reduced to, say \$1.25 per ton, at which no leasing cyanider would make an offer for them?" If this careful concentration were carried out, the resulting cost to the millman for carting the tailing from the settling pit must be added to milling cost. This is about 25c. per ton. "Would it not be better to send out a slightly higher-grade tailing and sell to the cyanider who discharges a 25c. instead of a \$1.25 tail."

It is a question, also, whether the gold in the concentrate which gets away with the sand is amenable to cyanide treatment. The sand from the Brilliant Extended assays \$2 and the slime \$4 to \$5, the mixture being worth \$3 per ton. "Would it pay to concentrate the fine mineral from the slime?" This additional concentration, it was stated, would cost 25 to 40c., increase the mill machinery 50 (?) per cent. and add seriously to labor cost. At the same time the value of the tailing might drop from \$2.50 or \$3 to \$1.50 per ton, and it would cost 75c. to cyanide this tailing and 25 to 40c. to cart it out of the pits.

## Slag Handling Arrangement at British Columbia Copper Company

To handle economically and efficiently the flow of slag during the interval of changing pots, the British Columbia Copper Company has in use at its Greenwood plant the device shown in the accompanying halftone illustration. The method adopted eliminates the necessity of a second spout on the settler, simplifies the track layout for slag disposal and avoids the spilling of slag, which invariably happens when an attempt is made



AUXILIARY SLAG BOWL

to change slag pots by holding a hand ladle under the settler spout.

The British Columbia arrangement is simple and merely consists of a bowl of ample capacity to be swung under the slag pot during the period of changing pots. It is an adaptation and amplification of the old hand-ladle idea with sufficient capacity provided and suitable means for sustaining and moving the larger bowl.

The slag-handling arrangement at this plant consists of two parallel tracks on which an electric locomotive handles the 225-cu.ft., motor-dumped slag pots. Short spur tracks connect the two parallel tracks at each settler and the locomotive, returning from the dump with the string of empties, takes the full pot from the settler to the outside parallel track, "kicking" it a short distance down the track, which is level at this point but has an upgrade as it approaches the dump proper. The locomotive then

leaves an empty pot at this furnace and passes on to repeat the operation at the next.

During the interval of changing the large slag pots, the auxiliary slag bowl is swung under the settler slag spout and receives the slag flow until the new pot is in position. During this period the auxiliary bowl is only filled to about one-third its capacity so that there is ample allowance for emergencies and delay in changing the pots.

The auxiliary bowl is approximately 2 ft. deep and is elliptical in shape with diameters of about 4 and 5 ft. The bowl rests in a cast-steel frame and is held

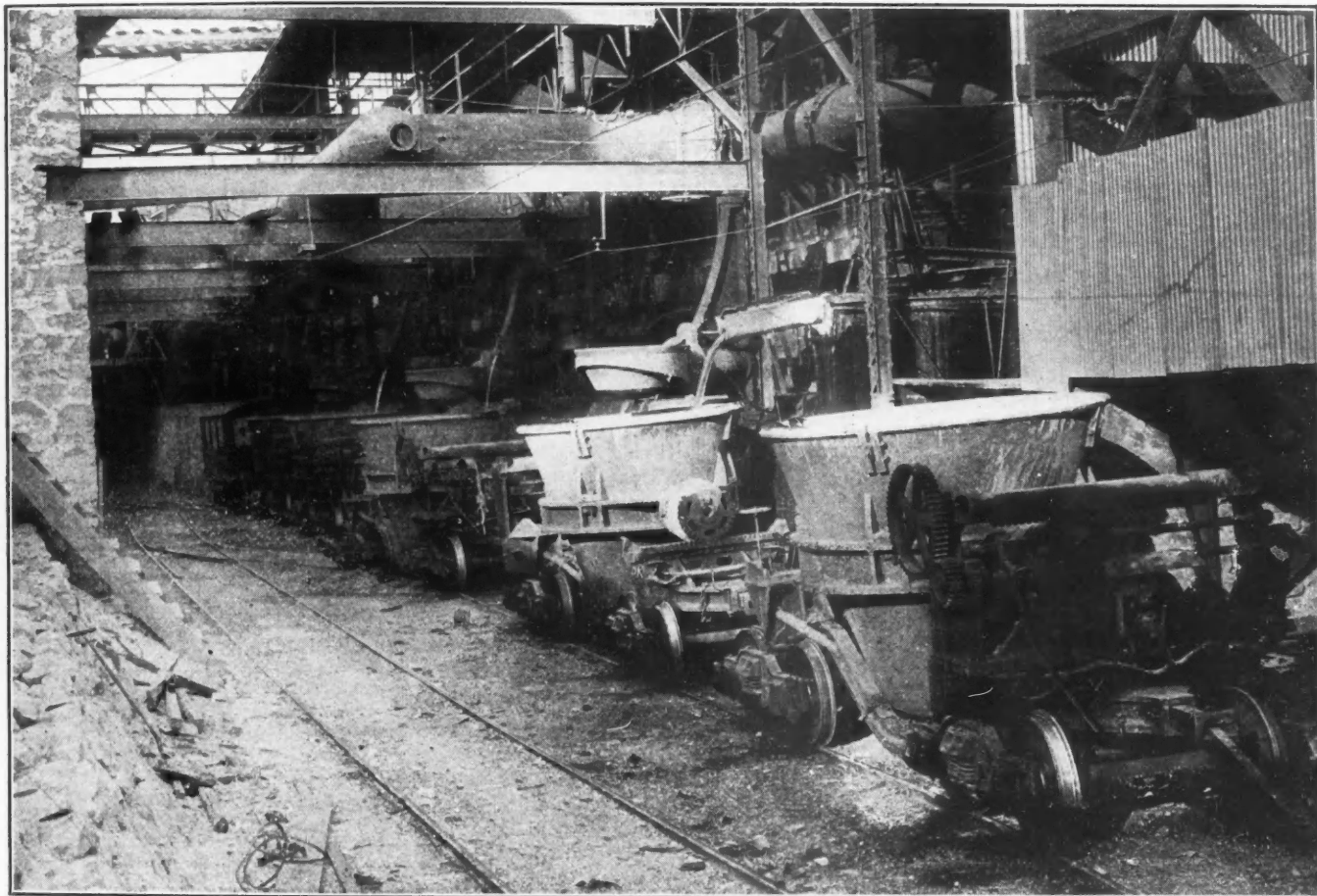
taken off the furnaces in two years on account of the blocking of the slag flow. The auxiliary-bowl arrangement was installed at the British Columbia Copper Company's smeltery in the autumn of 1906 and is not patented. We understand that a similar equipment is now used at the plant of the Canadian Copper Company at Coppercliff, Ontario.

An important consideration in the use of this auxiliary bowl is the fact that at no time does the slag stream impinge against the metal of the large and expensive slag pots used at the British Columbia plant. When a new slag pot is placed at a settler, the slag caught in

### Smooth Lining for Tube Mills

Of late there has been much discussion as to the best lining for tube mills, and the old silex liners have in many cases been replaced by the El Oro and similar types. The displacement of the silex lining is mostly due to the fact that the other types of lining can be renewed much more quickly and are cheaper.

It is interesting to learn the success of the smooth lining at the Butters', Virginia City, Nev., plant. Here 20 stamps, crushing to 2½ mesh supply the ore for four tube mills. The tubes are 5x22 ft. and are run 36 r.p.m. The linings



SLAG-HANDLING ARRANGEMENT AT BRITISH COLUMBIA COPPER COMPANY, GREENWOOD, B. C.

in place by lugs. The cast-steel frame is socketed in the swinging cast-iron frame. This cast-iron frame has ball bearings at both top and bottom, the base resting on a cast-iron seat in the floor and the top being fastened to a girder as shown in an accompanying view. The frame and bowl operate easily on these bearings and could be readily moved by a boy. The center of gravity of the auxiliary bowl is so placed that it tends to right itself when empty, and to dump when full. When receiving slag, it is held in position by a pawl in the ratchet near the handle.

This slag-handling arrangement has proved highly efficient at this plant and it is said that the blast has not been

the auxiliary bowl during the interval of changing pots is turned into the new pot at once, forming a pool or buffer to receive the slag stream of the settler. The bowls of the slag pots at this smeltery have not been replaced in two years and the incidental saving in this connection is noteworthy.

The problem of securing safety in hoisting, which is as old as mining, is still unsolved. The Langlaagte Estate, South Africa, has an experimental shaft head with which two inventors are working. These promise to stop gradually a cage with its load, a total of 8 tons at least, after it is detached from the hoisting rope, without friction on the guides.

are made up of rectangular pieces of smooth white iron 1¼ in. thick, 8 in. wide and 48 in. long. These iron plates are set in the tubes edge to edge and are bolted to the shell of the tube mills with 7/8-in. plow bolts.

It has been found that such linings, grinding the coarse, 2½-mesh material, last about nine months on Virginia City ores. The El Oro linings will do little, if any better and are more expensive. The duty of the mills is about the same with each type of lining, and either can be renewed in about the same length of time. In the Butters' mill the El Oro lining was tried first, and later discarded for the smooth-plate lining which is now used exclusively.

Useful Knots for Engineers—IV

By A. LIVINGSTONE OKE.\*

*Fig. 37, Slipping Lines*—A method of attaching a rope to a spar or post is shown at *A*. For heavy strains the toggle should be smooth and tapered. *B* is a slipline arranged with two bowlines and a toggle. *C* is a half hitch with a slip; a clove hitch may be similarly employed. *D* is a slip on a sllp knot. It can be used when the knot has to be made on the line before it is placed over the bar or post. In the arrangement with two bowlines shown in *E*, less strain comes on the toggle than in *B* and it is more easily slipped.

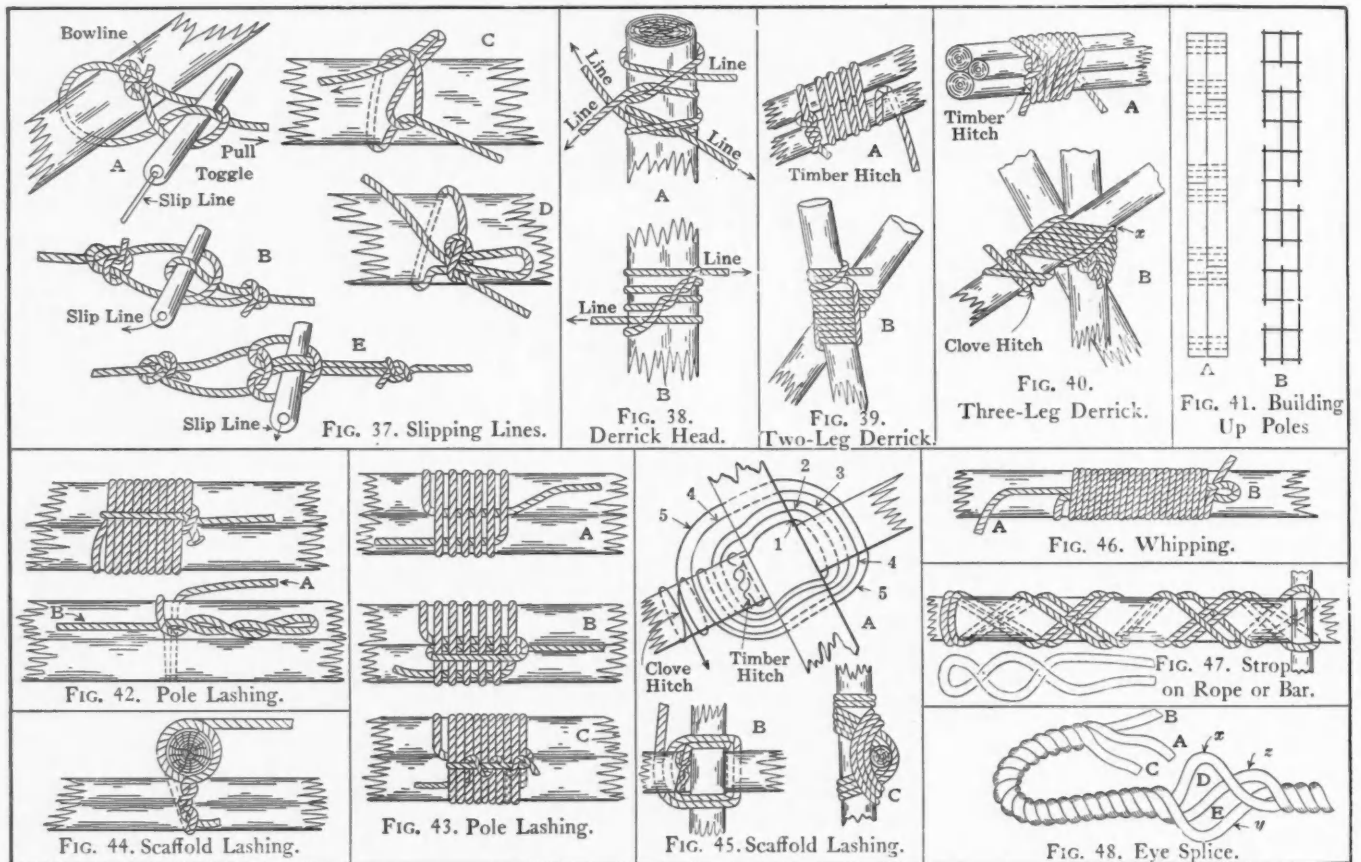
*Fig. 40, Three-leg Derrick*—The lashing is started with a timber hitch on one pole. The three poles are then laid together as in *A* and as many turns as required are taken around them. The rope end is temporarily pulled through the poles as shown. The three legs are then slightly spread and the turns around the poles are bound together by further vertical turns *x* in *B*. The lashing is then finished off with a clove hitch.

*Fig. 41, Building up Poles*—To build up a double pole to form a gin pole, the ends are butted and joints broken as shown in *A*. Lashings are put on at either side of each joint. The same method is employed with three poles, as shown diagrammatically at *B*.

ing is started with a timber hitch and is shown diagrammatically at *A*. *B* shows the first stage of lashing with only two turns complete, and *C* shows a side view of the finished lashing. If desired, wedges may be driven into the lashing to thoroughly tighten the turns.

*Fig. 46, Whipping*—A long bight is laid on the pole, turns taken around it, and the end drawn through the bight. This method of binding may be used to finish off a rope end; for binding splints to a fractured span to strengthen it; or to make the lashings on derrick heads and in scaffolding, the bight always being put well on the outside (see pole lashings).

*Fig. 47, Strop on Rope or Bar*—An



SLIPPING LINES, EYE SPLICE AND LASHINGS FOR DERRICKS, SCAFFOLDS AND POLES

*Fig. 38, Derrick Head*—Two clove hitches are employed as shown in *A* for two sets of lines. If it is desired that the lines should leave the pole from opposite sides, further half hitches may be put on until the overlaying of the turns brings the end around as shown in *B*.

*Fig. 39, Two-leg Derrick*—In *A* is shown the lashing started with a timber hitch and the end drawn through between the two poles. After the legs have been opened out, one or two turns are taken around vertically between the poles to bind the other turns together, and the lashing finished off with a clove hitch as in *B*.

\*Mining engineer, Argentine & General Exploration Company, Ltd., Rodeo, San Juan, Argentina.

*Fig. 42, Pole Lashing*—The bight is laid as shown in the lower sketch, and, after a sufficient number of turns are made, the end *B* is taken over outside the turns and put through the bight. End *A* is also put through the bight, and the whole tightened.

*Fig. 43, Pole Lashing*—This form of lashing is shown started at *A*, then the end is brought over and passed back under the turns as in *B*, and the lashing finished as in *C*.

*Fig. 44, Scaffold Lashing*—This is a lashing for holding a crosspiece in place when the strain is from above and not laterally. Less rope is required, but it does not lend itself to being tightened as well as the usual method, *Fig. 45*.

*Fig. 45, Scaffold Lashing*—This lash-

ing is started with a timber hitch and is shown diagrammatically at *A*. *B* shows the first stage of lashing with only two turns complete, and *C* shows a side view of the finished lashing. If desired, wedges may be driven into the lashing to thoroughly tighten the turns.

endless strop or sling is made and wrapped around the bar as shown. The diagram shows how the ends of the sling are alternately passed through each other. The power is, of course, to be applied to the toggle. This is a most excellent method for getting a strong grip on a smooth bar or tube, such as a drill casing or tube jammed in a drill hole. It is suitable for hanging a block or tackle to a gin pole or a mast or rope. The sling should be made of relatively small rope as it grips better. This arrangement is more powerful than a rolling hitch.

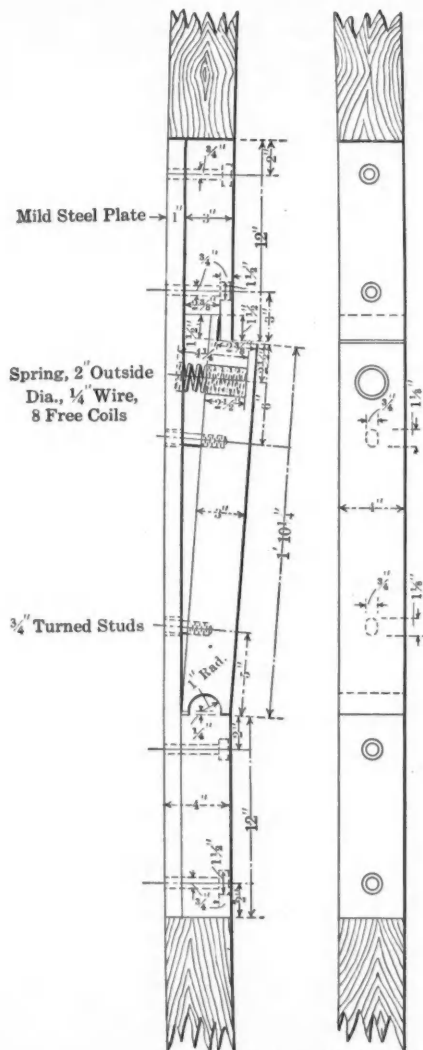
*Fig. 48, Eye Splice*—Open the rope as shown and pass the end *B* through to the back at *D*, and the end *C* through *E*; the center strand *A* will lie between



the two strands *x* and *y*. *A* is now passed over *x* and under *z*; *B* over *z* and under *y*; *C* over *y* and under *x*. All three ends are now up, lying between two of the strands of the other part or standing of the rope. The process of over the next on the left and then under the next strand but one is repeated as many times as the proposed load calls for.

### Safety Stop on Guide Timbers

The accompanying sketches have been made from data supplied by the South



The Engineering & Mining Journal

ARRANGEMENT OF GUIDE TIMBERS FOR SAFETY PURPOSES

Kalgurli Gold Mines, Ltd., and reported in the *Monthly Journ.* of the Chamber of Mines of Western Australia. The device is put in between the dumping station and the safety collar on the head-gear. It does not come into action unless the skip is overwound, and acts as an added safeguard to the ordinary safety hook.

In the case of a rapid overwind there is danger of the impact of the skip destroying the collar and damaging the safety dogs. Should this occur, there is nothing to prevent the skip from falling down the shaft after rebounding from the

impact. The safety stops are so placed that the skip is prevented from falling in the event of the destruction of the safety collar. The stops may be made of cast or mild steel.

### Tram Car Tipple

BY GUY C. STOLZ \*

A tram-car tippie used by the Cheever Iron Ore Company, and Witherbee, Sherman & Company, in the Mineville, N. Y., iron district, is similar in principle to the one described in the *JOURNAL* of Dec. 11, 1909, as being used by the Tennessee Coal, Iron and Railroad Company. A distinctive feature in this tippie is the bumping-block arrangement which is attached to the frame proper. The tippie

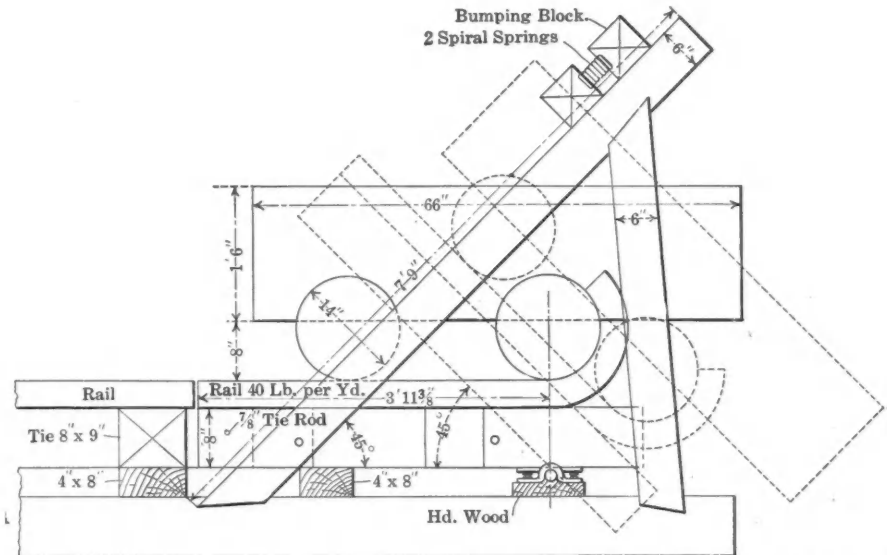
weight is 5174 lb. The energy is equal to  $5174 \times 0.167$ , or 864 ft. lb. Solving for velocity in the equation

$$E = \frac{Wv^2}{2g}$$

in which *E* = energy in foot-pounds; *W* = total weight; *v* = velocity and *g* = gravity, *v* is equal to 3.27 ft. per sec.; the velocity the car should be sent on the tippie to discharge its contents when the axle is in the position shown.

### Storing Compressed Air

Compressors of modern design are equipped with unloading devices which overcome, to a certain extent, the loss of power through air blowing off at the safety valve when a hoist or a number of drills are stopped for a few minutes.



The Engineering & Mining Journal

TIPPIE USED BY WITHERBEE, SHERMAN & CO., MINEVILLE, N. Y.

is made of 8x8-in. timbers, securely tied together and operating on a frame of 8x8-in. timbers. As the car assumes a position of 45 deg. in discharging its contents, the back of the car strikes against a bumping block, which has behind it, two spiral springs which contract 3 in. before the block will press against a second stationary bumper. This device lessens the shock to tippie and frame in dumping and makes a saving on tram-car repair bills.

The axle is in such a position with respect to the center of gravity of the car and tippie, that a tram car will automatically dump when pushed on the tippie at the average rate a man walks. The position of the axle for the first tippie was calculated in the drafting room by the following method: In tipping the car containing 3360 lb. of ore to a 45-deg. position, the combined center of gravity is raised 2 in. or 0.167 ft. The total weight of car and tippie is 1814 lb. With a load of 3360 lb. the total

But with an unloader cutting out the compressor every few minutes the daily capacity of the plant is much less than if it were allowed to compress air constantly observes C. Sangster in *Power*; and if that air could be stored and given back when all the drills and hoists happen to be at work at the same moment, calling for more air than the compressor could deliver, a great advantage would be gained.

The storage capacity of the ordinary mining installation is small. Suppose a 10-drill plant has a storage equal to 5000 ft. of 6-in. pipe and a receiver 48 in. by 15 ft. This would hold 1188 cu. ft. of compressed air, which at eight atmospheres would be equal to 9504 cu. ft. of free air. If the compressor were stopped, only about one-third of this air could be used, as when about that amount had been drawn off the pressure would be too low to do effective work. Ten 3/4-in. drills at a 3000-ft. altitude would pull down the pressure in this pipe line and receiving tank from 96 to 60 lb. in about four minutes.

\*Mining engineer, Mineville, N. Y.

# Dredging Operations of Natomas Consolidated

## SPECIAL CORRESPONDENCE

The Natomas Consolidated of California has recently offered on the London market \$5,000,000 6 per cent., first-mortgage, 20-year gold bonds. The proceeds of this issue, together with the subscription of an additional \$1,000,000 of the bonds in America, will be applied partly in the purchase and erection of five 13½-cu.ft. continuous-bucket-line dredges of an estimated capacity of 16,250,000 cu.yd. per annum, bringing the earnings from the dredging lands alone up to \$1,961,600 annually. The additional funds will also be used in completing the purchase of additional land and the construction of works for reclamation and irrigation. It is the intention of the company to make arrangements for supplying Sacramento, which is at present inadequately provided with water from the Sacramento river, not under pressure, with a constant supply of pure mountain water under pressure.

Natomas Consolidated is a going concern incorporated in 1908. The properties of the consolidation include large areas of dredging lands, important water rights, rock-crushing plants, real estate and the right by contract to purchase a tract of approximately 50,722 acres of

valuable land to be reclaimed, which immediately adjoin the city of Sacramento, being separated from it by the American river. These lands have a river frontage of 22 miles along the American and Feather rivers, and in connection with them a complete project of reclamation and irrigation has been prepared.

The prospectus is supported by a report by Charles M. Rolker, in which the history of gold dredging along the American river, geology, past results and future prospects are described in considerable detail. Mr. Rolker also supplies an interesting report on the subject of land reclamation and irrigation prepared largely from the reports of experts in these branches of engineering, notably that of Stephen E. Kieffer. He sums up his report on this branch of the company's business by saying that, from his intimate knowledge of the United States and of the Western States in particular, he feels that if the engineering part is well done the overflow lands of the Sacramento valley may well rival the valley of the Nile in fertility.

As regards the dredging of the auriferous gravel, Mr. Rolker described three distinct periods of gravel deposition on

the American river. The result of these deposits is a broad sheet of gravel with gold more or less evenly distributed through it, though richer channels exist within the present trunk system of dredging lands. It is probable that with the largely cheapened cost of dredging of late years, the entire tested areas will be dredged as one continuous mass of gravel.

In examining the ground, 1274 drill holes or test pits were put down. The average cost per cu.yd. during eight months of 1909 with eleven dredges in the Natoma, Folsom and Feather River divisions, is given at 3.885c., the minimum (Natoma) being 3.036c. and the maximum (Feather river) 5.17c. The average yield in the three divisions was 6.6c. per cu.yd. and the net returns \$780,410. According to Mr. Rolker the cost of a 13-cu.ft. dredge should not exceed \$200,000, and of a 13½-cu.ft. dredge \$250,000.

The estimated net profits on all proved lands of Natomas Consolidated is put at \$20,067,195, and on unproved lands an additional \$3,240,000. The life of the gravels with the new plant appears to be about 13 years.

# Report of Nipissing Mines Company

The Nipissing Mining Company, all the stock of which is held by the Nipissing Mines Company, completed on Dec. 31, 1909, the most profitable year in its history. Nearly four and three-quarter million ounces of silver were produced at a cost of 16.39c. per oz., leaving a net profit of \$1,687,000. The mining company paid the holding company \$1,535,-

### NIPISSING SHIPMENTS IN 1909.

	Tons.	Silver Oz. per Ton.	Net Value per Ton.	Gross Silver Oz.
High-grade....	1047.69	3,093.71	\$1518.17	3,241,259
Low-grade sil- icious ore....	5174.20	212.23	84.88	1,098,167
Concentrates..	183.07	855.42	400.73	156,606
Nuggets.....	7.63	19,771.12	9844.94	150,844
Total.....	6412.59	724.64	\$ 339.68	4,646,876

000 in dividends, the last dividend being paid in January, 1910. Out of this amount the Nipissing Mines Company paid four dividends aggregating \$1,500,000, or 25 per cent. on the capitalization. The net surplus of the mining company was \$913,195 at the end of the year.

The shipments made during the year are given in an accompanying table. The high-grade ore contained 8.46 per cent. cobalt and 6.98 per cent. nickel, and the

concentrate contained 8.32 per cent. cobalt and 3.78 per cent. nickel. Sales of cobalt amounted to 177,706 lb., worth \$19,833, and of nickel 117 lb., bringing

### COSTS AT NIPISSING.

		Per Ton Ore.	Per Ounce Silver.
Trenching.....	\$26,669		
Development.....	144,714		
Tunnels and shafts..	71,039		
Stoping.....	81,685		
Sorting and loading.	33,943		
Office and general...	96,141		
Total mine opera- tion.....	\$454,191	\$71.06	\$0.0961
Concentration.....	35,434	5.54	0.0075
Depreciation.....	49,799	7.79	0.0105
Marketing, etc....	263,224	41.18	0.0557
Corporation, etc....	12,483	1.95	0.0026
	\$815,131	\$127.52	\$0.1724
Less miscellaneous..	40,320	6.30	0.0085
Total cost of pro- duction.....	\$774,811	\$121.22	\$0.1639

\$14. The actual production for the year, adjusting stocks on hand, was 6391.75 dry tons containing 4,727,231 gross oz. of silver worth \$2,462,039 gross or \$2,222,562 net. The profit on the operations amounted to 68.53 per cent. of the gross. The detailed costs are given in an accompanying table. During its life,

Nipissing has shipped 14,860 tons of ore containing 12,747,468 oz. of silver.

Work was carried on in 1909 through 10 shafts and two tunnels, and a total of 4504 ft. of drifting, 2528 ft. of crosscutting, 996 ft. of raising, 423 ft. of sinking and 9483 cu.yd. of stoping were done. An average of 87 men were employed five and one-half months in the trenches, of which 33.1 miles, averaging 3.4 ft. deep were dug. This work was entirely confined to the central area, which had al-

### AREA OF NIPISSING.

	Total Acres.	Partly Pros- pected.	Unpros- pected.
Conglomerate....	429	306	123
Keewatin.....	176	157	19
Diabase.....	241	16	225
Total.....	846	479	367

ready been prospected. The management proposes to remove the overburden from the entire surface of the property. The surface conditions are given in an accompanying table.

The Nipissing Reduction Company, a custom concentrator on Nipissing ground, treated the low-grade ore from No. 63 vein. Its operations are given as illus-

trating the present milling of Colbalt ores: Dry weight concentrated, 11,159 tons; silver contents of ore, 311,824 oz. (27.94 oz. per ton); concentrates produced, 264.44 tons; silver contents of concentrates, 246,462 oz. (932 oz. per ton).

The ores reserves are estimated by Manager Watson as 6,539,200 oz. silver

in 10 veins, more than three times the reserve of a year ago. The estimate is based largely on past results, and when an orebody is cut through by a drift and is not further developed by winzes or raises, ore is estimated not further than 10 ft. above or below the tunnel.

The known veins on the property now are numbered up to 132, and one vein

discovered during the year, No. 122, has already produced over 400,000 oz. of silver. The largest production was made from No. 63 vein. Winzes sunk below the 146-ft. level showed conglomerate at 45 ft. and ore is probably below the present depth of working. The largest vein is No. 64, which shows 30 in. of ore at one place.

## Fifth Annual Report of Utah Copper Company

The report of C. M. MacNeill, president of the Utah Copper Company, dated April 1, 1910, states that the capital stock outstanding at that date was 1,540,100 shares, of which 734,375 shares were outstanding Dec. 31, 1909; 310,000 were exchanged for Boston Consolidated; 422,288 were exchanged for Nevada Consolidated and 73,437 were sold at \$50 per share. It is not contemplated that any of the remaining 959,900 shares will be issued in the immediate future. In the fiscal year ended Dec. 31, 1909, the net earnings were \$2,160,090. The income account was printed in the JOURNAL of April 2.

### UTAH BALANCE SHEET, DEC. 31, 1909.

ASSETS.	
Cost of property acquired.....	\$5,972,901
Improvements at Garfield plant..	4,097,592
Improvements at Copperton plant	31,277
Mine, surface equipment.....	434,480
Prepaid expenses, ore.....	1,513,946
Ore held in reserve at Garfield	
Mill.....	5,094
Garfield Improvement Company..	40,000
Garfield Water Co.....	100,000
Accounts receivable.....	114,158
Storehouse supplies and fuel.....	311,858
Equity in copper in transit.....	1,371,374
Cash in banks.....	91,131
	\$14,083,815
LIABILITIES.	
Capital stock outstanding.....	\$7,343,750
First mortgage bonds outstanding	7,500
Treatment and refining charges	
not yet due.....	381,406
Accounts payable.....	45,490
Hospital fund.....	20,327
Nat'l Bank Com., New York.....	197,963
Surplus (amount rec'd above par	
from sale of stock).....	3,143,750
Undivided profits.....	2,943,626
	\$14,083,815

The gross profit of the company from July 1, 1904, has been \$5,293,004, from which has been paid \$151,102 interest on bonds, \$37,500 bonus on retirement of first issue of bonds and \$2,160,775 in dividends, leaving undivided profits Dec. 31, 1909, \$2,943,627. Of this amount, \$1,562,698 was invested in fixed assets, leaving a net working capital of \$1,380,929.

The stock mentioned above as sold at \$50 per share yielded the company an additional capital of \$3,671,850 since the close of the year. The Utah and Boston Consolidated properties are now being operated as one, and this additional capital will be utilized in part for the enlargement of the Arthur (Boston Consolidated) mill to a capacity of at least 6000 tons per day. The slight changes necessary in the Magna plant (the old

Garfield mill) should not exceed \$60,000. It is expected that by July or August at the latest, the Magna plant will have a regular capacity of from 10,000 to 12,000 tons per day, although originally designed for a capacity of 6000 tons.

### GRADE OF ORE RESERVES DECREASED

During the year the underground development amounted to about 24,000 ft., at an average cost of a trifle over 4c. per ton of ore mined and shipped. Most of the development was in the southeasterly and northwesterly portions of the orebody and increased the fully and partially developed areas to 104 acres. The net quantity of ore remaining in this area is over 90,000,000 tons, of which 50,000,000 are fully developed. The ores developed during the year are somewhat lower in grade than that hitherto reported, and bring the average grade of the reserves down to  $1\frac{3}{4}$  per cent. copper.

The total amount of capping removed during the year was 1,526,000 cu.yd., an average of over 127,000 cu.yd. per month. The total stripping removed to date amounts to 3,232,000 cu.yd.

The total area over which stripping operations have been conducted is 37 acres; the average thickness of capping shown by all stripping to date is 71 ft., corresponding to about 115,000 cu.yd. per acre. The actual area fully stripped at the close of the year was 16.4 acres; the total yardage removed, however, represents the equivalent of completely stripping 28 acres. The area over which stripping has been partially completed contains approximately 1,000,000 tons per acre, so that the work has resulted in removing a quantity of capping equivalent to the complete stripping of approximately 28,000,000 tons of ore. About one-seventh of this quantity of ore has been removed from the area in question.

During the first quarter of the year the ratio of underground ore to the total ore mined was in excess of 21 per cent.; during the last quarter less than 3 per cent. of the total ore mined came from underground. The averages for the entire year were 13 per cent. of underground ore and 87 per cent. of steam-shovel ore. The total ore treated was 2,674,271 tons.

Both the Garfield and Copperton plants were in continuous commission throughout the year, although neither of them could be operated at full capacity, excepting for short periods, on account of a deficiency in tonnage due to inadequate transportation service. This loss in tonnage averaged about 20 per cent. of the capacity of the plants.

### MILLING AND COSTS

The total production of copper contained in concentrates, was 54,472,845 lb.; the resulting net production, after smelter allowances and deductions were made, was 51,749,233 lb. The concentrates also yielded 20,862 oz. gold, and 198,943 oz. of silver, after smelter deductions on silver. The average grade of concentrates for the year was approximately 26 per cent. copper.

The ore treated during this period contained approximately 5 lb. of copper less per ton than that milled during the preceding 18 months. This decrease in grade resulted largely from a discontinuance of production of underground ore.

The average price received for copper sold during the period was 12.915c. per lb. The average cost per pound of copper produced, based on the net pounds of copper resulting after smelter deductions and allowances were made, was 8.787c. per lb., this cost including all expenses of smelting concentrates, and the refining, transportation and disposition of the metal. The average total cost of mining and milling, exclusive of transportation and smelting charges, was 94.43c. per ton of ore treated. Included in this cost is a charge of  $9\frac{1}{4}$ c. per ton, which covers all underground development costs at the mine, and a proper proportion of stripping expense.

The costs above stated include the expense of mining an average of 13 per cent. of the ore produced from underground; during the latter portion of the year, when nearly all of the ore was mined by surface methods, the total mining and milling cost, including all underground development expense and proper proportion of stripping expense, was reduced to less than 80c. per ton, and this cost will be further reduced on a full capacity basis, when all the ore is mined by steam shovels.

### Old Dominion and Subsidiary Companies

The Old Dominion Company, as the holding company which owns the entire capital stock of the United Globe Mines and 155,245 shares of the 162,000 issued shares of Old Dominion Copper Mining and Smelting Company, reports the payment of three 50c. dividends amounting to \$439,867 in 1909, and a surplus of \$71,307 Dec. 31, 1909.

The Old Dominion Mining and Smelting Company, Globe, Ariz., paid three dividends of \$1 per share each in 1909, amounting to \$486,000, and produced 34,519,301 lb. fine copper, 154,545 oz. silver and 2257 oz. gold, of which 9,101,589 lb. copper, 120,490 oz. silver and 468 oz. gold were from custom ores. During the year reductions were made in the mining and smelting costs, but the concentrating department showed a slightly increased per-ton cost as follows: Mining cost, \$5.08 per ton of ore mined in 1909 as against \$6.33 in 1908; concentrating, \$0.74 against \$0.60 per ton; smelting and converting, \$2.52 compared with \$2.83 per ton of charge. These reductions permitted the mining of smelting ore averaging 1.1 per cent. less copper than in the previous year, and concentrating ore averaging 0.16 per cent. less copper, at a slightly lower cost per pound of copper mined.

The average grade of smelting ore mined was 6.71 per cent. copper, and the concentrating ore contained 2.9 per cent. The concentrator treated 106,537 tons of company ore and 17,440 tons of custom ore.

In the smelting department the lessened cost was mainly due to the substitution of lower-priced Western coke for about half of the Eastern coke formerly used. The smelting cost was 0.03118c., and converting 0.00509c. per lb. of fine copper produced. The practice has been inaugurated of resmelting all converter slags, thereby securing the needed flux and eliminating barren material from the furnace charge.

Development was chiefly with the view of finding and opening ore at the east and west ends of the mines. The pumping problem is one of the most serious at the mine, the maximum flow of last year being over 5,000,000 gal. in 24 hours. The main steam-pumping station is being placed at the 12th level, where there will be two pumps with a capacity of 1200 gal. per min. each, and two with 900. All water from below will be raised to this level by electric pumps.

At the United Globe mine, the year recorded a profit of \$80,041 as against the deficit of \$73,968 in 1908. Several good bodies of ore were exposed in the Old Dominion vein, and sufficient sulphide ore discovered to render the Old Dominion smeltery independent of foreign sulphide ores.

### Alaska United Gold Mining Company

The Alaska United Gold Mining Company, owning the Ready Bullion and 700-Foot Claim mines on Douglas Island, Alaska, made a net profit for the fiscal year ended Dec. 15, 1909, of \$261,743. Four dividends aggregating \$234,260 (26 per cent. on issued stock) were paid, and the company carried forward \$100,686 to the balance sheet.

At the Ready Bullion mine, 2170 ft. of development work were done, including the sinking of the main shaft to a total depth of 1926 ft. on the incline. There were 227,710 tons of ore of an estimated average value of \$2.37 per ton mined and sent to the mill at a total mining cost of \$1.13 per ton, inclusive of development. The ore reserves below the 900-ft. level are estimated at 1,116,650 tons worth \$2.68 per ton.

The 120-stamp mill lost only 13 days time during the year and crushed 227,710 tons of ore at a cost of \$0.2497 per ton. The ore yielded in free gold, including copper and base bars, \$278,868, or \$1.22 per ton, and \$215,359 from sulphurets treated, or \$0.9457 per ton, making a total yield of \$494,227, or \$2.17 per ton.

The 700-Foot Claim mine produced and milled 190,474 tons at a mining cost of \$1.37 per ton inclusive of the cost of 4370 ft. of development done. The Alaska-Mexican company crushed 38,100 tons of this ore and the "700" mill crushed 32,425 tons of Mexican ore. The ore reserves are given at 536,069 tons, averaging \$2.36 below the 660-ft. level.

The 100-stamp mill ran 341½ days and crushed 184,799 tons of ore at a cost of \$0.2468 per ton. The ore yielded in free gold, including base bars, \$265,606, or \$1.44 per ton, and \$224,083 from sulphurets treated, or \$1.21 per ton; making a total yield of \$489,690, or \$2.65 per ton.

### Bauxite Production

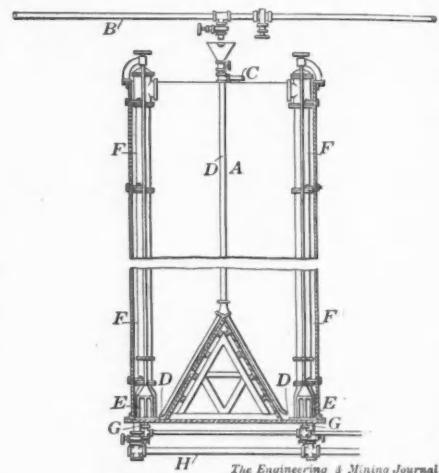
According to statistics collected for THE MINERAL INDUSTRY, the production of bauxite in the United States in 1909 amounted to 90,325 long tons, valued at \$475,110, an average of \$5.26 per ton. The bulk of the production, 54,966 tons, came from Arkansas and Tennessee; 33,515 tons from Georgia; and 1814 tons were mined in Alabama. In 1908 the production was 52,167 tons, valued at \$263,968.

The chief producers of bauxite in this country are the Republic Mining and Manufacturing Company, 1111 Harrison building, Philadelphia, Penn.; Aluminum Company of America, Pittsburg, Penn.; National Bauxite Company, Rome, Ga.; John Hawkins, Rome, Ga.; Howard Hydraulic Cement Company, Chattanooga, Tenn.; and the Cherokee Mining Company, also of Chattanooga.

### Apparatus for Treating Ore Pulp.

The salient feature in an apparatus patented by B. MacDonald, of Guanaquato, Mexico (U. S. Pat. 948,766, Feb. 8, 1910), for treating ore pulp and slimes, is the minimizing of the deposition of heavy particles on the bottom of the tank, and constantly transferring them to the upper part of the tank as they settle.

Referring to the drawing, *A* is the tank, preferably of steel, *B* the pulp or slime main, which discharges into a funnel with a perforated bottom where it meets the cyanide or other chemical solution. The pipe *C* is for admitting compressed air, or water under pressure, to the charge pipe *D*.



MACDONALD'S PULP AGITATOR

The valve casings *E*, one on each side of the transfer pipes *F*, are provided with openings that are closed or opened by valves or slide gates having operating rods which are pushed up or down by handles at the top. The pipes *F* are fitted with tees at their upper end; through the side opening the pulp flows into the tank, and air escapes through the perforated top, from jets in the valve casings. These jets, supplied by compressed air from the pipe *G*, extend well into the casings, where they terminate in expanded or bell-shaped ends.

The outlets for the pulp after it has been treated are within the valve casings, and discharge into the pipe *H*, which conveys the treated charge to the waste dump.

### Correction

Referring to the article in the JOURNAL of April 9, 1910, on the "Smelting of Bismuth-Lead Ore, Sinaloa, Mexico," Mr. Bretherton writes that the analysis of the ore mentioned in the third line from the bottom of the first column, page 773, should read "copper, 0.9" per cent. instead of "copper, 9," as given in the type-written manuscript.

# The Black Range Mining District, New Mexico

Some High-grade and Large Veins of Low-grade Ores Found; High Extraction by Laboratory Tests; No Development below Water Level

BY MARTIN FISHBACK\*

A mining district worthy of more notice than has hitherto been given to it is the Black Range district, situated on the eastern slope of the Black range in the northern part of Sierra county and continuing into the southern part of Socorro county, N. M. The Black range constitutes a section of the continental divide; the creeks and streams on the eastern slope emptying into the Rio Grande.

The district is reached via Engle, a station on the Santa Fe railroad 112 miles north of El Paso, Tex. From Engle a daily mail stage runs to Fairview and Chloride, 50 and 53 miles respectively, crossing the Rio Grande at the site of the Elephant Butte reclamation project.

were rounded up by Government troops and rendered harmless.

The first mining rush occurred at the time of the finding of the Ivanhoe mine, 10 miles northwest of Fairview, where the town of Grafton was built. Some rich ore carrying several hundred dollars in gold and silver to the ton, was found on a large outcrop on this property and a few cars of this grade of ore were shipped from the claim. In a few weeks after the Ivanhoe strike, the town of Grafton had a population of between 1000 and 2000 people. By virtue of this increased number, principally composed of prospectors and the usual allotment of adventurers, the Indians were somewhat intimidated

and underlying rock is a limestone, probably Cretaceous judging from a small patch exposed near Wild Horse creek, four miles north of Grafton. These overflows have been subjected to subsequent intrusions by a system of north and south dikes, 10 to 30 ft. wide and generally composed of yellowish granite-porphry.

From the character of these dikes it may be reasoned that the basement rock underlying the limestone is a granitoid, the original source of the dikes. However that may be, these intrusions were accompanied with large volumes of silicic acid, and a system of gold and silver-bearing quartz fissures were formed along the dikes. In some places the dike will constitute the hanging-wall of the vein, and *vice versa*. There are also cases where, apparently, a vein occurs without being associated with a dike, but there is no question but the movement incident to the forming of the dikes is responsible for the existence of the vein.

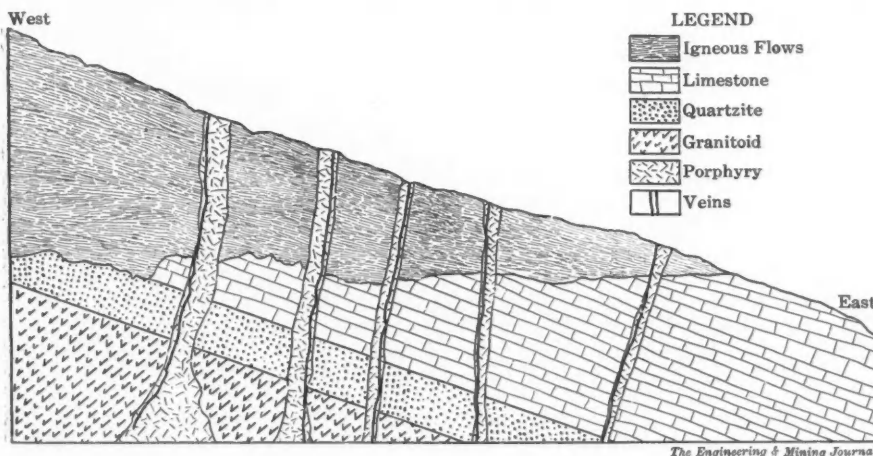
The veins are from 3 to 15 ft. wide and have a dip of 5 to 30 deg. from the vertical, generally to the east. The country rock is as a rule softer than the vein material, and erosion of the former has left the veins cropping out prominently, which made prospecting comparatively easy as far as locating the lodes was concerned.

### LITTLE DEVELOPMENT DONE

During the excitement incident to the Ivanhoe strike every outcrop resembling a vein was covered with a location and much surface work was done throughout the district, looking for bonanza ore. The limited development done in the district indicates large bodies of low- and medium-grade gold-silver ores, carrying from \$6 to \$12 per ton in gold and silver, about equal amounts of each. High-grade ore in shipping quantities has been found in the Ivanhoe, Great Republic and U. S. Treasury claims and it is probable that similar ores will be found on other properties.

The veins all show extreme leaching, and so far no development has been done below water level at any point in the district. The Ivanhoe has the deepest shaft, 385 ft. below surface, sunk with a windlass 27 years ago, but no laterals were driven below the 185-ft. point. The vein is 5 ft. wide in the bottom of the shaft and will average \$8 per ton. No water was reached in this shaft owing to its being situated at an elevation of 500 ft. above the creek level.

The U. S. Treasury property is now



IDEAL SECTION, BLACK RANGE DISTRICT

Fairview is the principal post office and supply point for the district, although Chloride, 3 miles farther on, also claims this distinction.

### HISTORY

About 1880 ore was first discovered in this district. At that time this section of New Mexico was the favorite hunting ground of the Apaches; the mountains were then, as now, heavily timbered, well watered with creeks and streams and contained an abundance of game. The Apaches promptly resented the white man's appearance, and it was war for the prospectors from the beginning. It required nerve to prospect this rough, heavily timbered, mountainous country under those conditions, but eventually, as always, the red man had to give way. He did not do so amicably, however, and Indian fights and raids kept up for several years until finally Victoria, Geronimo and other less important chiefs

and prospecting in the surrounding mountains became safer.

There are yet to be seen, however, on the bluffs and high points around Grafton, remnants of "forts" made of rocks where outposts were stationed to warn the camp of approaching Indians.

### VEINS FOLLOW DIKES

The vein system may be said to be 14 miles long, approximately 2½ miles wide, and at an average elevation of about 7500 ft. The summit of the range is four to eight miles farther to the west and attains an elevation of 8000 to 10,000 ft. The vein formation and mineralization is strongest in the northern half of the district; yet one of the principal gold properties, the U. S. Treasury mine, is situated at the south end.

The formation consists essentially of a series of igneous overflows, principally rhyolites and andesite, occurring in sheets and masses and probably 1000 ft. or more in thickness in some places. The imme-

\*Consulting mining engineer, El Paso, Tex.

being developed by a company of Colorado Springs men, and is showing up well. The Great Republic property, near the north end of the district, shows a large oreshoot which comes to the surface. There is hardly an outcrop in the district, but shows free gold by panning. Silver occurs generally as stephanite, and traces of tellurium are also present.

#### HIGH EXTRACTION IN TEST

A laboratory metallurgical test on a general sample representing the average of the district showed an extraction of 79.5 per cent. by straight amalgamation followed by concentration; 49 per cent. of the gold and 15 per cent. of the silver

being saved by amalgamation. The ore was crushed to 60 mesh. A cyanide test on the tailings brought the total extraction up to 98 per cent. of the gold and 80 per cent. of the silver. The ores average 90 per cent. in silica, and a small percentage of magnetite is present. Vugs of manganese occur in the veins, especially in the Ivanhoe.

Near the north end of the district, in Socorro county, on a group of claims called the Elephant, a vein outcrops for a distance of several thousand feet and stands out in bold relief 10 to 20 ft. above the surface. On this group an attempt was made to go below water level with no hoisting apparatus but a windlass, but

water was struck at 45 ft. in too large quantities to handle. A few tons of ore were taken out just at water level which averaged more than an ounce in gold, whereas near the surface the vein would assay only a trace to a few dollars in gold. A similar increase occurs at water level on Poverty creek, on a claim now called the Gold Reserve, and where work was also discontinued on account of no facilities for handling the water.

From the two instances mentioned it may be reasonable to look for an increase in metallic contents below the leached zone, and perhaps a change in character of the ores, possibly nothing more radical than the appearance of iron-pyrites.

## Report of Iron Silver Mining Company

The annual report of the Iron Silver Mining Company, Leadville, Colo., for the year ended Dec. 31, 1909, states that the year was an important one with respect to the many improvements that have been introduced at the Tuscon shaft, all tending to a more economical operation at the mine. The ore produced from the Tuscon shaft was formerly hauled to the railroad by wagon at a cost of 60c. per ton. In order to eliminate this expense, an aerial wire-rope tramway was constructed in 1909. It is 1400 ft. long and has a carrying capacity of 20 tons per hour. Its operation has been highly successful and economical from the first. The ore is now transported and loaded into the railroad cars at a cost of 10½c., showing a saving of 49½c. per ton. The total cost of the tramway was \$7854, including terminal building.

#### ORE SORTING

On account of the complex mixture of the various sulphide ores, with more or less waste rock, it is necessary to sort the ore before shipping it. In order to provide sorting facilities for an increased tonnage, and means for loading the finished product into tramway buckets, it was necessary to enlarge and reconstruct the Tucson ore house. This was done at a cost of \$5582. The scheme for handling the ore is as follows: As the ore comes from the mine it is dumped into hoppers where it is fed to sorting tables. The waste rock is picked out and thrown into mine cars and trammed to the waste dump. The lead ore is then picked out from the zinc ore, and each class thrown into separate cars, which are dumped into storage bins. From these bins the shipping ore is loaded by gravity, through chutes, into tramway buckets. On reaching the lower terminal, the tramway buckets discharge their loads directly into railroad cars. The cost of sorting the ore by this method is 22c. per ton of finished product.

Several new pieces of machinery were purchased during the year, and the Tucson shaft was equipped with an electric hoist. An electric signal system and underground telephones were installed which have proven to be of great convenience in the daily operations of the mine. The total cost of all permanent improvements was \$19,459, including new machinery.

#### MOYER MINE

While it cannot be said that any new oreshoots were developed in the Moyer, it is true that bodies of ore have been recently opened in the immediate vicinity of the old stopes that were overlooked in the mining operations of former years. In certain portions of the mine orebodies were found underlying or occurring over the main oreshoots previously stoped out, and separated from the old stopes by a layer of limestone or a sheet of porphyry. Owing to the peculiar conditions existing in the Moyer, which has been reworked and stoped so many times, it is impossible to make any estimate of the exact tonnage available, since the ore in many of the working faces is apt to lead into an old worked-out stope at any time. At present a large proportion of the output is being gleaned from old stopes.

This condition has given rise to some difficult mining problems. In breaking into the old stopes, they are found filled with loose timbers, large blocks of rock and caved material, and great skill is required to prevent serious caves and accidents. Whenever it is possible, the old stopes are being filled with waste rock. A part of the underground tramping and all of the hoisting and surface tramping expense is thereby avoided.

#### TUCSON MINE

The orebodies in the Tucson workings are holding out in a most gratifying manner, while the development during the year was generally successful in open-

ing ore in the new deeper levels of the mine. Large stopes of low-grade zinc ore were opened northwest of the shaft between the fifth and sixth levels. The existence of a large tonnage of sulphide ore has also been established in this section of the mine. During the year the shaft was sunk to a deeper horizon which is considered an important feature of the year's work. Not only will it permit of a more economical mining of ore-bearing fissures already developed, but it definitely determines the downward extent of the fissures.

#### PRODUCTION OF IRON SILVER MINING COMPANY.

Kind of Ore.	MOYER MINE.		TUCSON MINE.	
	Tons.	Value.	Tons.	Value.
Zinc.....	13,127	\$60,252	7,895	\$79,050
Lead.....	6,104	39,532	7,477	66,865
Copper.....	6,066	41,371	1,666	64,264
Carbonate.....	41	592		
Dump.....	16,949	8,293		
Silicious.....			74	7,092
Silver-lead-zinc.....			153	23,774
Iron.....	11,480	40,408		
Total.....	53,767	\$190,448	17,265	\$241,045

In addition to the ore from the Moyer and Tucson mines, a number of leases yielded 3134 tons, worth \$15,530. The total tonnage was 74,166, valued at \$447,024, an average of \$6.02 per ton. The development work during the year at the Moyer and Tucson shafts was 3286 feet, which includes shaft, winzes, raises and drifts.

The receipts from sales of ore, royalty and interest were \$440,318. The total expenditure account for the operating departments was \$237,738 (\$3.20 per ton); for permanent equipment, \$19,486. The operation of the company shows a profit of \$183,122 or about \$2.47 per ton. The surplus on hand, Dec. 31, 1909, was \$329,342. Dividend No. 52, which amounted to \$50,000, was declared during the year.

# Oil Flotation Process at Broken Hill, N. S. W.

Zinc and Lead Sulphides Are Collected in a Froth and Floated off; Highest Recovery Is Made from Slime. Total Cost, \$1.84 per Ton

BY THEODORE J. HOOVER\*

The material treated in the plant which is described herein is an accumulation of old tailings from the Central mine wet concentration plant. The plant, the tailings and the process belong to the Minerals Separation, Ltd., of 62 London Wall, London. Another similar plant is working on the current tailings from the lead concentration plant of the Central mine. The average assay of the tailings is: Silver, 7.5 oz.; lead, 6 per cent.; zinc, 19.5 per cent. A partial mineralogical analysis of the tailings is as follows: ZnS, 27.1 per cent.; ZnSO<sub>4</sub>, 2.4; PbS, 6.4; PbSO<sub>4</sub>, 1.3; FeS<sub>2</sub>, 2.5; MnO<sub>2</sub>, 4.6; CaCO<sub>3</sub>, 3.2; SiO<sub>2</sub>, 42.4 per cent.

The sulphates are largely the products of weathering since the tailings were dumped; the carbonates occur naturally in the ore as it is mined, the chief car-

amount of quartz and rhodonite and smaller quantities of garnet, calcite, rhodochrosite, feldspar, fluorspar, cerussite, chalcocite, etc.

## HANDLING THE DUMP MATERIAL

To facilitate the loading of the old tailings and in order to cut a way through the dump for a railway, the method of loading by "chinamen" was adopted. A carefully timbered tunnel was driven into the dump and a track laid on the incline to the top of the mill. Chutes with doors were made at intervals in the roof of the tunnel and the cars were run beneath these chutes and filled by gravity. When the material had been drawn away from above the tunnel so that an open cut extended the whole length of the dump, the tunnel timbers were taken

## GRINDING SECTION

From the bins the material is fed by push feeders to eight classifiers of a form invented by G. A. Chapman, former superintendent of the mill. The overflow goes direct to the V-box settler and the underflow goes to eight positive-feed 8-ft. grinding pans. These push feeders insure a regular feed, a most important factor for good work in this, as well as in all other well regulated concentration plants. These pans are called positive-feed pans because the material with about five times its weight of circuit water from the head tank is fed into a water-tight cylinder surrounding the shaft of the pan; the outlet from this cylinder is through the muller, so that everything fed into it must pass un-



MINERALS SEPARATION PLANT AND DUMP AT CENTRAL MINE, BROKEN HILL, N. S. W.

bonate mineral being a complex one containing manganese, iron, calcium, zinc and magnesium. This mineral is amorphous and relatively soft. Under the microscope the sulphides appear to be nearly free from attached gangue. The galena is mostly in the fine portion of the tailings and retains its cubical form, while the blende is flaky. The blende is composed of zinc, iron and manganese sulphides in about the following proportions: ZnS, 81 per cent.; FeS, 14 per cent.; MnS, 3 per cent. The silver occurs largely in pyrrhotite. The blende carries less silver than the galena and in some cases an appreciable amount of silver occurs with the garnet. Apart from the sulphides and carbonates mentioned, the tailings contain a large

amount of quartz and rhodonite and smaller quantities of garnet, calcite, rhodochrosite, feldspar, fluorspar, cerussite, chalcocite, etc.

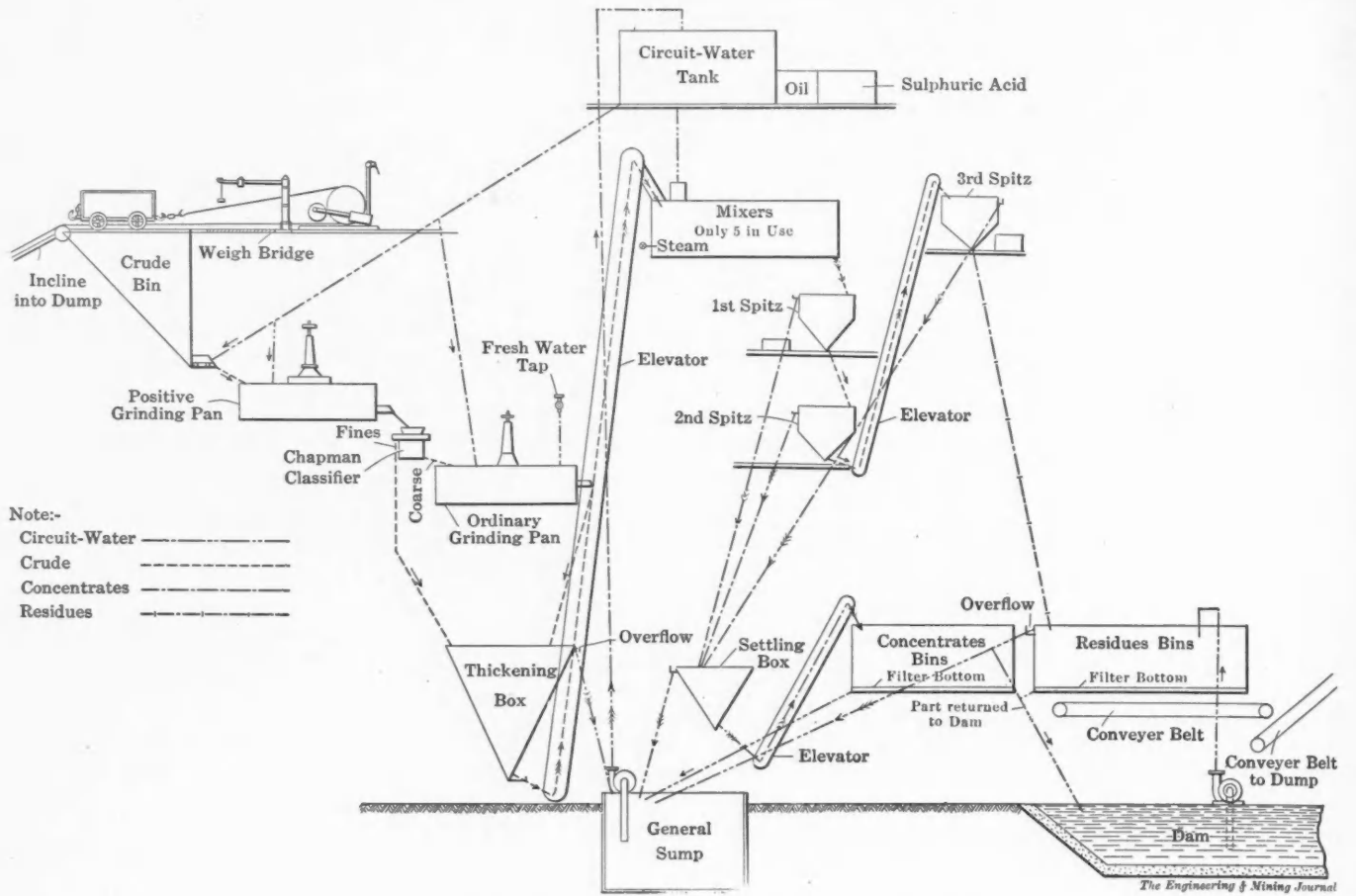
After weighing, these cars in trains of three are hauled up the double-track incline by a steam winch, and dumped into the bins. One winch man and nine laborers per shift, working two shifts of eight hours each, deliver the daily tonnage to the bins.

The bins are covered with a 2-in. grizzly to remove rocks, chips, etc. The bins, which hold enough for two shifts, are shaped in cross section like a "W," thus dividing the mill into two units, one on each side of the bin. The two-unit idea is carried as far as the concentrate and residue-handling appliances, where the material from the two units is brought together and handled in one set of appliances, as shown in the plan.

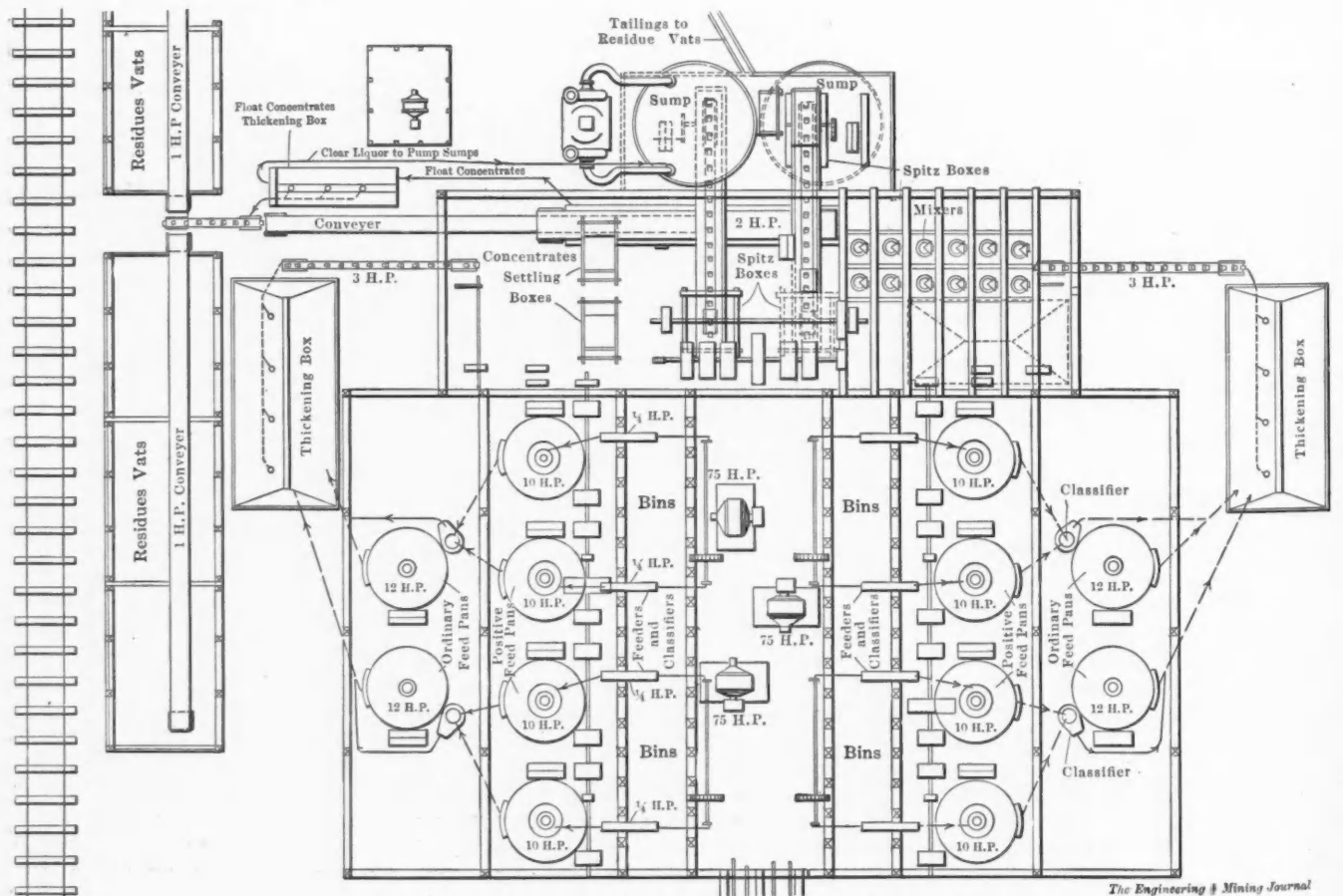
der the muller before being discharged. The discharge from these pans is placed low and the sides of the pan need be only high enough to prevent splash.

From the positive-feed pans the pulp goes with more water to four classifiers, which have a capacity of 125 to 175 tons per day. The overflow from the classifiers goes direct to a large settling box. The underflow from the four classifiers goes to four ordinary-feed 8-ft. pans, where it is finally made to pass a 0.0241-in. screen. The discharge from these pans joins the overflow from the classifiers in the settling box. These twelve pans grind 750 tons per day from a maximum of 0.1270 in. to a maximum of 0.0241 in. Two men per shift attend to the whole grinding and classifying section.

\*General manager, Minerals Separation, Ltd., London.



DIAGRAMMATIC FLOW SHEET, MINERALS SEPARATION, LTD.



MILL PLAN, MINERALS SEPARATION, LTD., BROKEN HILL

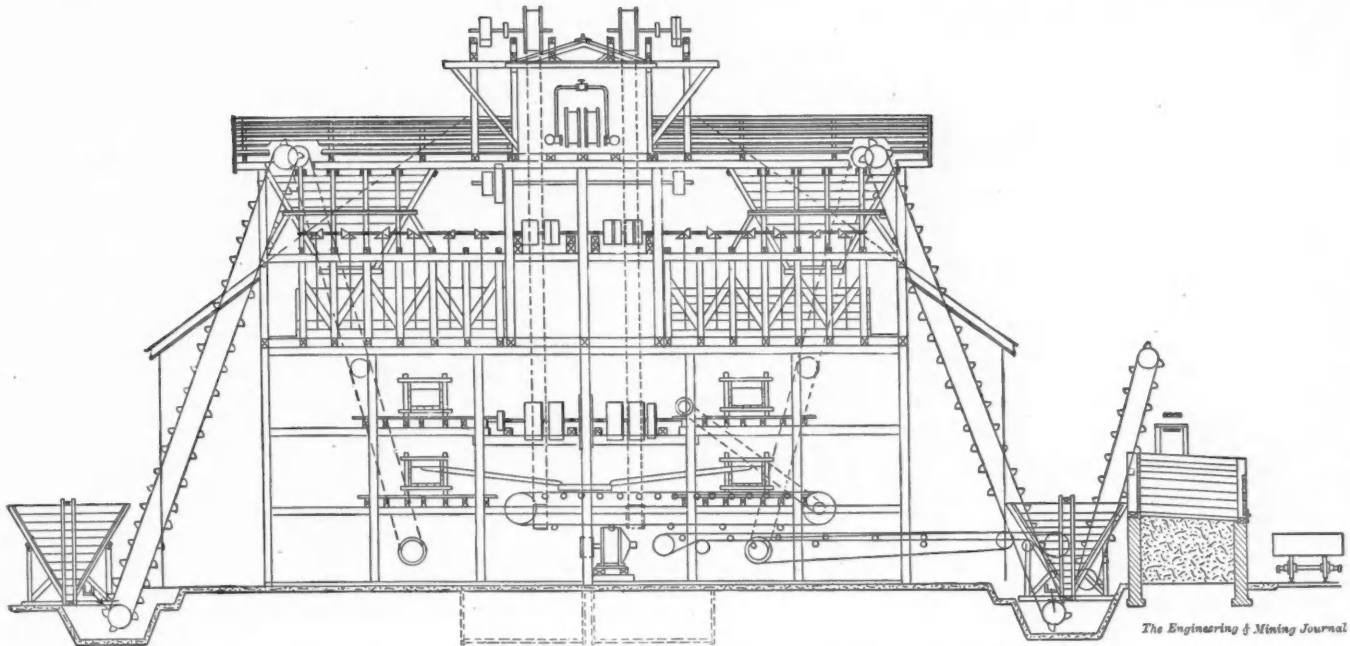


SETTLING AND MIXING

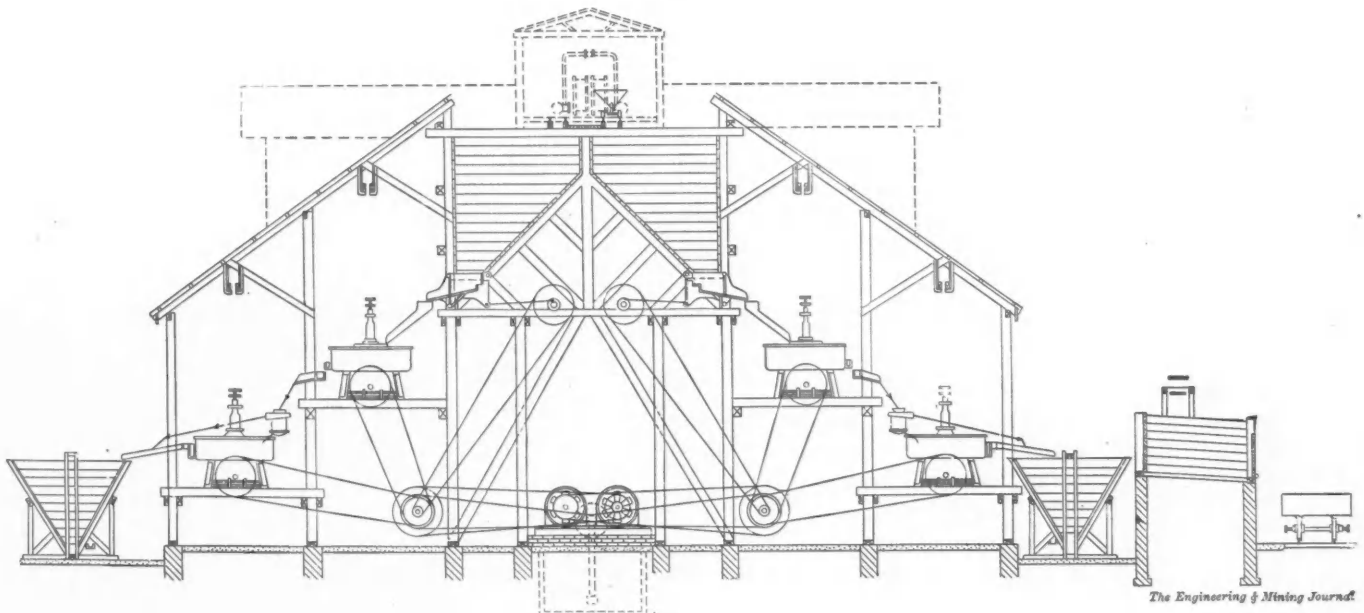
The pulp from the pans is about 15 per cent. solids by weight. This being too dilute for efficient and economical work in the flotation section, the material runs from the pans into two V-shaped settling boxes 18x10x10 ft. The con-

ments, 3x3x5 ft. deep, and lined with hardwood. These compartments communicate with each other near the bottom. In each compartment is an agitator of special design driven 220 r.p.m. The pulp is fed by the elevators into one end compartment and steam is intro-

quantity of air. In this way the sulphides in the pulp are churned into a froth, and the whole mass emerges from the last compartment about a foot above its floor and is led by a flume to the first spitz box. In this frothing action lies the success of the process.



SECTION THROUGH FLOTATION DEPARTMENT, MINERALS SEPARATION, LTD.



SECTION THROUGH GRINDING DEPARTMENT, MINERALS SEPARATION, LTD.

tinuous, slightly colloidal or muddy overflow returns to the head tank to join the general circuit. The underflow from the settling tank, above 25 per cent. solids, runs by gravity to the boots of two elevators which feed the flotation section. Two boys per shift attend to the settling boxes and elevators.

The mixing apparatus is of the simplest form that could be devised. This is a box divided into series of compart-

ments, 3x3x5 ft. deep, and lined with hardwood. These compartments communicate with each other near the bottom. In each compartment is an agitator of special design driven 220 r.p.m. The pulp is fed by the elevators into one end compartment and steam is intro-

duced with the pulp by a 1½-in. pipe and the temperature of the whole raised to 115 deg. F. Fifteen pounds of mono-acid per ton of ore is fed into the first compartment and one pound of oil per ton of ore into the second compartment of the mixing box. These agitators give the pulp in its progress violent agitation and splash it against the sides of the compartments and beat and roll into the pulp a great

THE FLOTATION

The froth, which floats immediately the pulp emerges from the mixers, is composed of zinc and lead sulphides and bubbles of air. Repeated observations fail to detect appreciable quantities of carbonic acid or gas other than air. The seething, frothing pulp falls upon a submerged apron within the spitz box, the froth being drawn off over a lip at the opposite side of the box by a slight

overflow current, the underflow being less than the inflow. The gangue with most of the circuit liquor passes out at a hole in the side of the spitz box near the bottom, the size of which hole is governed by an ingenious slicing valve invented by T. H. Perrott. The concentrates from the first spitz box are led by flume to the concentrate-collecting box, while the residual pulp in the underflow, still frothing and seething, is led to a second spitz box, where a further concentrate is removed. From the second spitz box the residual pulp, still seething and frothing to some extent as the last of the air occluded by the agitation escapes, is elevated to a third spitz box similar in every respect to the first and second, and where the last useful concentration takes

water, are run by launder to a row of six residue vats. It is necessary to settle the residues carefully in order to save water, because water costs 5s. per 1000 gal. The total loss by evaporation, seepage, etc., is 100 gal. per ton of ore treated. These residue vats have a capacity of about 85 tons each. A vat is filled with circuit water from the supply before any residues are run in, and the vat thereby acts as a settling tank, the overflow which carries a small amount of concentrate froth returning to the head tank in the mill via centrifugal pump. These residue vats have a rough filter in the bottom and are also provided with a bottom discharge hole. After a full vat has drained about six hours, the movable cylinder is raised by a screw and the

The costs of treatment over a three-month period in the early part of the operation of the plant when the daily tonnage was about 550 long tons are given in an accompanying table. The capacity of the plant has since then risen to 750 tons per day and this has of course decreased the total cost per ton. The distribution of cost remains about the same as before with the exception of oil, acid and water, these being practically fixed charges per ton. The other charges, notably those of power and labor, are much reduced when distributed over 750 tons.

Subdivided according to departments, the following totals are chargeable: Trammings, 12.957c. per ton; crushing, 41.081; flotation, 107.678; handling con-

SIZING TEST ON PRODUCTS FROM MINERALS SEPARATION FLOTATION PLANT.

Approximate Width of Aperture in Screen, Inches.	Crude at Hoist.	No. 1 Classifier Overflow.	No. 1 Classifier Underflow.	Positive Pans Discharge.	No. 2 Classifier Overflow.	No. 2 Classifier Underflow.	Ordinary Pans Discharge.	V Settler Underflow.	V Settler Overflow.	Discharge from Mixers.	No. 1 Spitz Overflow.	No. 1 Spitz Underflow.	No. 2 Spitz Overflow.	No. 2 Spitz Underflow.	No. 3 Spitz Overflow.	No. 3 Spitz Underflow.	Residue Vats Overflow Liquor.	Pump Delivery Liquor.
On 0.1250	2.50		0.449															
On 0.0992	2.15		1.89															
On 0.0787	2.00		3.77	0.05														
On 0.0625	5.00		7.30	0.04		0.25												
On 0.0496	6.20		5.56	0.19		0.24												
On 0.0394	10.30		9.05	1.25		1.57	0.20	0.16		0.14		0.16		0.10			0.10	0.25
On 0.0313	8.30	0.18	10.10	6.45	0.10	9.65	0.64	0.37		0.16		0.36		0.40			0.27	0.10
On 0.0248	6.70	0.76	10.00	12.00	1.02	16.10	3.07	2.08		0.50		1.16		0.45			1.40	0.07
On 0.0197	17.80	1.00	10.40	13.42	2.40	20.10	4.90	4.00		5.38	0.92	6.83	2.37	7.65	1.06		12.95	0.95
On 0.0156	8.70	3.38	8.66	11.13	4.65	14.12	6.40	5.77	0.08	4.23	1.23	5.20	4.35	7.15	3.31		11.25	1.40
On 0.0124	6.70	7.03	8.13	10.56	7.87	12.14	10.46	9.54	0.03	8.60	5.08	10.20	7.10	8.15	6.96		11.55	1.97
On 0.0098	7.50	9.94	6.32	9.49	10.43	9.05	13.00	12.00	0.23	12.36	10.08	13.23	12.70	12.45	12.80		15.05	2.72
On 0.0078	5.90	14.90	5.72	8.54	13.16	6.47	15.87	15.00	3.80	14.66	15.14	14.93	16.05	14.25	14.20		13.50	4.27
On 0.0062	4.10	16.05	3.73	6.72	7.38	3.54	12.90	13.30	7.50	14.06	16.70	13.33	15.10	13.45	13.64		10.80	5.52
On 0.0049	1.30	4.55	0.77	1.25	7.00	0.72	2.86	3.20	3.40	5.63	7.33	5.13	5.65	5.10	5.38		3.80	3.12
On 0.0039	1.12	6.69	1.06	2.34	6.79	0.95	4.48	4.93	2.41	3.76	4.88	3.16	3.85	3.47	3.70		2.55	2.75
On 0.0031	0.05	8.42	0.87	2.78	8.22	0.60	6.85	7.35	4.60	8.66	11.63	6.86	6.00	7.07	7.60		3.65	10.50
On 0.0025	4.70	26.90	5.37	12.57	30.94	4.39	16.47	20.00	77.80	21.46	26.33	18.53	24.45	19.30	30.60		62.00	66.66
Through 0.0025	1.53	0.17	0.93	1.18			1.98	2.27	0.15	0.40	0.68	0.92	2.38	1.01	0.77		0.23	4.28
Correction																		
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

place. The concentrate froth, although black in color, has the appearance and consistency of the froth on beer and is of depth as follows: First spitz box, 2 to 3 in.; second spitz box, 1 to 1 1/2 in.; third spitz box, 1/4 to 1/2 in. One man and two boys per shift attend to the flotation section.

COLLECTING THE CONCENTRATE

The concentrate from all the spitz boxes is led by launders to a common collecting box built with baffles so arranged as to submerge the froth repeatedly, the end sought being to discontinue the flotation or drown the concentrates. This collecting box is tapped at the bottom at intervals to draw off the settled concentrates which are elevated and carried by belt conveyer to the various draining bins. These bins, of which there are eight having a capacity of 70 tons each, are provided with rough cocoa-matting filters whereby the concentrates are drained sufficiently to be loaded by shovel into railway trucks. Four men per shift attend to the care and loading of concentrates.

The residues from the third spitz box, with the greater part of the circuit

residues drop to a belt conveyer and go by it to a boom stacker and so to the dump.

EXTRACTION AND COST

The result of the first two years' operations, including the "tuning up" period, in which about 400,000 tons of material were treated, is given in an accompanying table.

RAW MATERIAL AND RECOVERY.

	ASSAY.			RECOVERIES.		
	Ag. Oz.	Pb. %	Zn. %	Ag. %	Pb. %	Zn. %
Crude	7	6	20	100	100	100
Concentrates	14	10	47	75	70	85

These recoveries are calculated on the total lead and zinc present in the ore, no deduction being made for oxidized material present in the ore. There is a custom at Broken Hill of deducting the oxidized lead and zinc before calculating the recoveries in flotation processes. This custom is mentioned here in order to condemn it.

The capacity of the plant has been steadily maintained at 750 tons per day.

concentrates, 13.236; handling residues, 8.912 cents.

Electric power is purchased from a generating plant, and the items are as follows: 8 push feeders, 4 h.p.; 2 elevators, 13.236; handling residues, 8.912 cents.

COST OF TREATMENT PER TON.

	Cents.	Cents.
Labor—Superintendence	3.744	
General	16.296	
Sundry	8.520	
Residues	7.152	
Concentrates	8.688	
Assays	1.752	
Trammings	10.320	
Total		56.472
Stores—General	14.352	
Assays	0.696	
H <sub>2</sub> SO <sub>4</sub>	24.264	
Oil	12.960	
Timber	0.624	
Water	12.792	
Accident	1.008	
Locomotion	1.728	
Total		68.424
Power—Fuel	11.112	
Electric	27.336	
Total		38.448
General expense	20.520	
Grand total		\$1.838

vators, 8; 2 elevators, 6; 1 winch, 5; 8 pans, 72; 4 pans, 40; 10 agitators, 50; 2 pumps, 20; shafting and friction, 45; total, 250 horsepower.

This plant was erected at the time of labor shortage and labor disturbance and it would be safe to deduct 20 per cent.

from the labor and contracting cost. The total cost of construction, installation and opening the dump was \$124,000.

WORKING DETAILS OF INTEREST

The oil and acid are pumped by compressed air to the feed tanks at the top of the mill, the storage tanks being on the ground at some distance from the plant. The feed is set at a constant rate and not varied unless the tonnage fed to the pans varies. The regularity of feed to the pans then becomes a matter of importance, otherwise the proper proportion of oil and acid will not be maintained, too much being quite as detrimental as a deficiency.

of the gangue slimes, and also to some extent beneficially affect the flotation.

In low first cost of plant, cheapness and ease of operation, and quality of work, this plant is without an equal in flotation concentration. It marks a definite advance in the art of concentration.

The Nundydroog Gold Mine

The report of the Nundydroog mine, India, for 1909 records a prosperous condition of affairs. The value of the gold won amounted to £326,470 from 90,100 long tons crushed, a return of nearly an ounce to the ton. This output constitutes a record for the mine, which has now produced about £4,000,000, out of which over a million and a half has been distributed to the proprietors. The cost of working per ton, including London expenditure, amounted to about 33s. (\$8) per ton. Dividends paid in 1909 aggregated £113,200, or 40 per cent. on the nominal capital, besides which a sum of £20,000 has been placed to a reserve fund. The ore reserves, on which no definite value is given, but which are presumably equal to the average grade now being worked, are slightly in excess of what they stood at the close of the previous year.

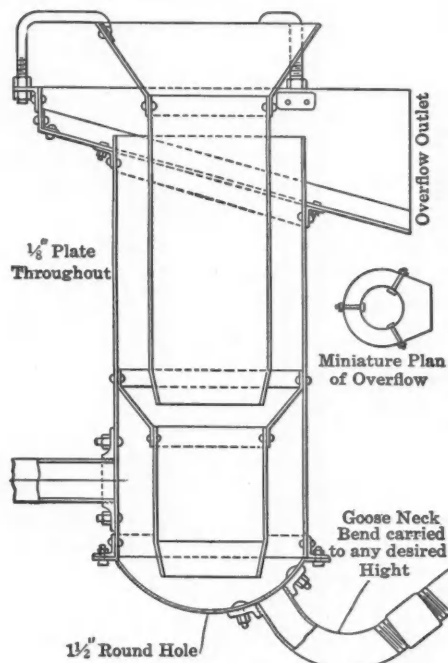
The manager reports that the conditions in the lower levels of the mine have improved sufficiently to make the prospects of the company brighter than for a long time past. The manager of the mine, Thomas Richards, who has successfully administered the affairs of the company for 15½ years, is retiring and will be succeeded by his son, Charles H. Richards, who has been employed on the Kolar goldfields for many years.

Great attention is paid to the health of the employees on this as well as the neighboring mines under the control of John Taylor & Sons, so much so that it is claimed that in times of plague and cholera the Kolar goldfield is considered one of the safest places in India. When an epidemic occurs, the natives come flocking into the district instead of flying out of it, and consequently the labor supply is always abundant.

Polybius, in the second century, B. C., described the rich gold and silver mines of the Tyrol. These mines yielded abundantly until the middle of the sixteenth century, after which date their productiveness rapidly diminished because the mouths of shafts became covered with ice. A shaft sunk at this epoch was covered in 1570 by a glacier 65 ft. thick. Resistance to the invasion of the ice soon became impossible. In the eighteenth century the glacier was more than 300 ft. high and in 1875 it had attained a height of 400 ft.

CONSTRUCTION COSTS OF TAILINGS PLANT OF THE MINERALS SEPARATION, LTD., BROKEN HILL, N. S. W.

Opening up dump																					
Machine																					
Timber																					
Electric Motors																					
Belts																					
Iron-work																					
Masonry																					
Pipe and Fittings																					
Castings																					
Galvanized Iron																					
Sundry Stores																					
Labor Day																					
Labor Contracted																					
Drafting																					
Superintendence																					
General Charges																					
Total																					



CHAPMAN CLASSIFIER

The heating of the pulp has a double effect: In the first instance it thins the oil and so induces its quick adherence to and selection of the sulphide particles; and in the second instance it both drives the air out of solution and makes it available for froth production, and expands the bubbles and renders them more buoyant, i.e., increases their lifting power.

The larger the proportion of slimes in the pulp the higher the percentage of recovery. This point is so surely established as to be beyond discussion. It then becomes a simple problem to decide where the economical mean lies between power consumed for fine grinding and added recovery. Material ground to pass 200 mesh can be treated with a high recovery.

It has been found that by using the water over again an increase in the solids in solution takes place. This has a beneficial effect on the working of the plant up to 4000 grains per gallon, as these solids assist in the settlement

# The Quarries of the Canadian Asbestos District

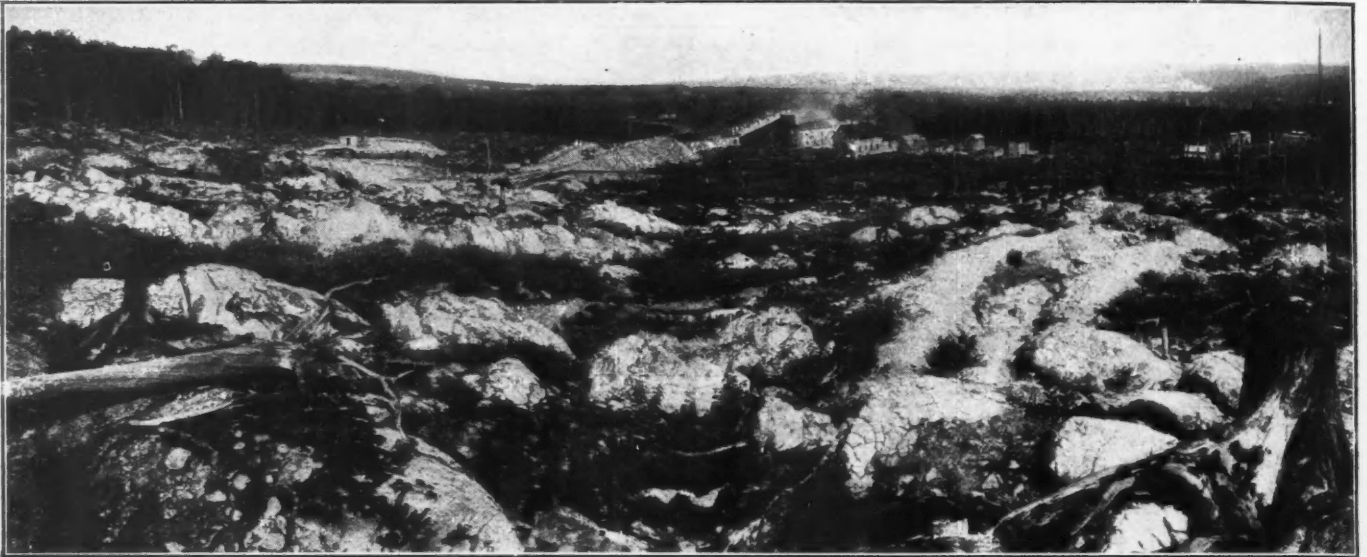
Canada Supplies Most of World's Market; Asbestos Occurs Only in Serpentine; Productive Area Restricted but Large Supply Ahead

B Y F R I T Z C I R K E L \*

Asbestos, when freshly obtained from the rocks, has more the appearance of an organic substance than a mineral. It presents sometimes tall, slender crystals from 1/16 to 2 in. long, suggesting complete crystallization in a mineralogical sense; but at other times it is of such

When first discovered and mined in the Italian Alps in the beginning of the last century, asbestos seems to have been looked upon only as a substance of interest to the mineralogists and geologists; no practical application in a commercial sense was ever attempted, and it

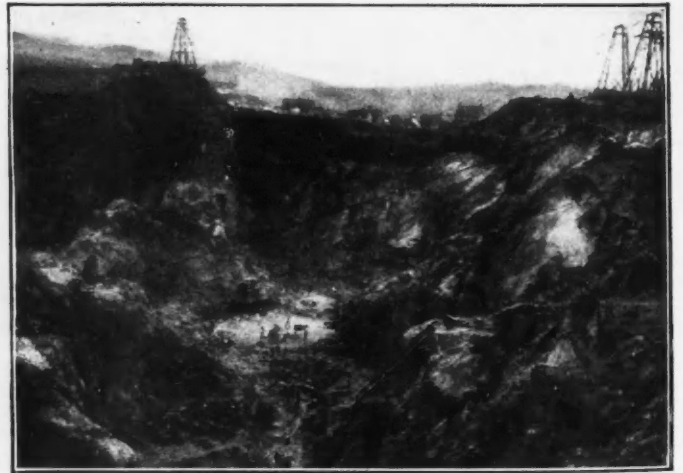
other parts of the eastern townships since that time, yet the high-grade qualities, combining length and great silkiness in the threads, are found in large payable quantities in these two localities only, where now all the principal mines are situated.



PLANT OF ROBERTSON ASBESTOS COMPANY, QUEBEC, SHOWING PRODUCTIVE SERPENTINE ROCK



KING'S PIT ASBESTOS QUARRY, THETFORD, QUEBEC



QUARRY OF BELL ASBESTOS COMPANY, THETFORD, QUEBEC

light and feathery weight that it resembles silk or fibers of other substances of organic origin. The Romans, who obtained it in small quantities in the Italian Alps, believed it to be of vegetable origin, evidently its unctuous feel, silky appearance and fluffiness contributing to this belief.

\*Consulting mining engineer, 80 Stanley street, Montreal, Canada.

was not until about 1870 that experiments were attempted on a large scale by London people with asbestos mined in the Aosta valley, Italy.

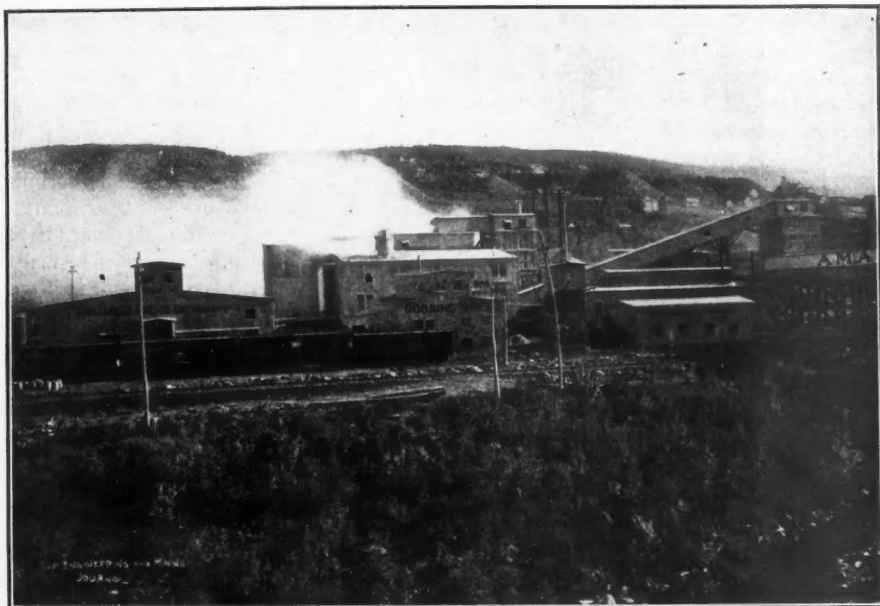
Concurrently with this discovery, asbestos was also found in Canada, but it was not until 1877 that mining was commenced in the serpentine hills of Thetford and Black Lake in the province of Quebec. Asbestos has been discovered in

## OCCURRENCE OF ASBESTOS

The asbestos is found only in serpentine. The productive character of this rock varies with its color, hardness and chemical composition, but in all cases it is essential for its economic productiveness that the ratio of silica, magnesia and water be about the same. A chemical analysis of these productive serpentines shows them to contain: Silica, 39 to 41

per cent.; magnesia, 39 to 43; water, 13.8 to 15 per cent. Serpentine in which part of the magnesia has been replaced by lime produce brittle fiber which cannot be used for the purpose to which the regular fiber is applied.

With the exception of a small territory lying outside the main productive belt, that at Danville, the quarries are scattered over a stretch of about 22 miles in the townships of Coleraine, Thetford, Robertson and Broughton. The width of this serpentine belt is in some localities only 100 ft., and in others from one to four miles; the largest width known is that between the towns of Thetford and Black Lake. It must not be inferred that this greater width would necessarily contain the greatest number of quarries; on the contrary, it was found that a great part of the serpentine is of the nonproductive variety.



MILL OF AMALGAMATED ASBESTOS CORPORATION, BLACK LAKE, QUEBEC

The asbestos proper occurs in the form of small veins from 1/16 to 2 in. in width, and is irregularly distributed, forming a network through the mother rock, serpentine. There is no regularity to be noticed anywhere; accumulations of veins alternate with dead and unproductive serpentine, the former constituting the pay shoots which produce the so called "crude" (long fiber) asbestos and the mill rock. This great irregularity in the occurrence of the asbestos pointed to quarrying as the best method of winning the mineral, and this method has been in vogue since the beginning of operations.

#### QUARRIES AND MILLS

The asbestos serpentine, as compared with many other rocks, is of medium hardness and is easily spalled and disintegrated. As a result of continued operations covering a period of many years,

large quarries may be seen in the district, especially in Thetford; the King's Pit quarry of the Amalgamated Asbestos Corporation measures over 1350 ft. long by 300 to 400 ft. wide, and is almost 200 ft. deep. The method of quarrying is simple; the rock is blasted down in galleries and benches; whatever "crude" may be found in the blasted rock is separated roughly right in the quarry and sent to the cobbing sheds; the residue consists of waste rock and mill rock, both of which are hoisted by cable derricks, placed in three- or four-ton dumping cars and sent to the dump or the mill.

The extraction of the fiber from the serpentine has been brought down to a science. The rock undergoes a process of diminution and the fiber liberated from all rock matter in the first stages of this process is placed in fiber receptacles by means of exhaust fans. The residue still

rock per day were installed; but since that time the demand for the mineral has been so great that all the older companies have had to increase and even double the capacity of their mills. There are at present 10 companies working in the district, with 19 quarries and mills, employing in the summer season over 3000 persons. The combined capacity of all mills is 8250 tons of rock per day.

#### PRODUCTION AND USES

As to the immediate outlook of the Canadian asbestos industry, it must be stated that the superior quality of the Canadian mineral is now universally acknowledged. From the beginning of the industry until 1910, Canada produced asbestos to the value of \$23,500,000 and the production is now at the rate of over \$2,500,000 per year.

The principal application of asbestos is in the manufacture of asbestos mill-board, paper, boiler and steam-pipe covering, etc., and allied articles; about 65 per cent. of the asbestos mill fiber being absorbed by these manufactures alone. A new invention in fireproof materials, asbestos slates and shingles, is also being introduced. There is an ever-growing demand in the construction of fireproof buildings, such as railway stations, summer cottages, office buildings, etc., where asbestos is used for all classes of works, as asbestos cover, roofing material and floorings. In battle-ships and ocean liners asbestos is used largely as a building material and as an insulator, to avoid condensation of steam and to prevent the heat from the boiler rooms from penetrating into other parts of the ship. New factories for the manufacture of asbestos goods are being built every year.

#### FUTURE OF CANADIAN MINES

The heaviest buyer of Canadian asbestos is the United States. According to the Quebec Bureau of Mines, the United States in 1907 imported \$1,304,480, which was 78 per cent. of the total Canadian production, Great Britain importing 13 and Germany 8.4 per cent. However, according to inquiries made at the headquarters of one of the bigger corporations these figures are not entirely correct. For instance, many shipments are made to Germany by way of New York which are generally credited to the United States. One firm in Hamburg alone received during 1908 about 7000 tons of fiber and "crude," which evidently were included in the United States importations. It may here be stated that Canada in 1908 contributed 83 per cent. of the world's total supply of asbestos.

Russia is increasing its output every year, but, owing to many reasons, the Russian mines can compete only in the higher grades of fiber, which forms a small percentage of the total production.

containing fiber is submitted in some mills to the action of rollers, and in others to "cyclones." While it must be admitted that this process so far has given some satisfaction, the fact must not be lost sight of that the fiber, through the violent action in the fiberizers, especially in the cyclones, is to some extent torn up into threads of smaller length, reducing the value of the resultant product. Further improvements are being made and machinery is being manufactured which will do away to a certain extent with the destroying forces acting upon the delicate fiber.

The old-time method of extracting the "crude" by hand and leaving the residue on the dump has thus been replaced by modern mechanical methods, and since 1896 all the larger quarries have been equipped with complete milling and fiberizing plants. Up to 1904, 16 mills with a total capacity of 3600 tons of asbestos

The medium grade is mostly used in home consumption. Asbestos has also been discovered in Western Australia, in the Carolina district of the Transvaal, in Cyprus and other foreign countries, but although some of these occurrences date back five or ten years ago, not one of them has proved to be of such a character and extent as to invite capital for systematic exploitation.

Concerning the future ore supply in the Canadian quarries, although the extent of serpentine is quite large, recent investigations tend to show that the productive area of asbestos within these limits is comparatively small; of all the discoveries which have been made in the last five years, especially in new territory, only three of four promise to become asbestos quarries in a true sense. It may be stated, however, that the present available resources in the Canadian asbestos field are considered large and no fear is entertained as to the future ore supply. The resources of the Thetford quarries have never been a subject of serious study, but considering past achievements, and considering further that the greatest Canadian quarry, the King's Pit, has been in operation for over 25 years and has contributed about one-third of the whole Canadian production and is today only 190 ft. deep, the Canadian operators have no reason to worry about the future.

### Metal Production of Upper Silesia in 1908

SPECIAL CORRESPONDENCE

According to the statistics of the Upper Silesian mines and reduction works, published by the Upper Silesian Mining and Metallurgical Society, there were in operation in Upper Silesia during 1908, 18 zinc reduction works, with a total of 484 furnaces, of which 310 were one-story furnaces, with 12,360 muffles, and 174 were of more than one story with 18,456 muffles. In these works there were employed 8444 workmen, who earned 8,231,056 marks (\$1,959,775). There were treated 562,443 metric tons of ore and zinkiferous products, of which 212,640 tons were calamine (carbonate), and 344,182 tons were roasted blende. The consumption of fuel was 1,030,280 metric tons of bituminous coal, and 284,205 tons of coke slack were used as reducing material. The consumption of fireclay was 69,239 tons.

There were produced 141,461 metric tons of spelter, worth 54,529,468 marks (\$12,983,206), 3863 tons of zinc dust, worth 1,269,903 marks (\$302,358), 1163 tons of lead worth 297,402 marks (\$70,810) and 32,795 kg. of cadmium worth 203,822 marks (\$48,529), a total of 56,300,595 marks (\$13,404,904). There

were 11 blende-roasting establishments in operation, which treated 413,486 tons crude blende and produced 344,122 tons of calcined blende. Eight zinc-rolling mills worked 48,521 tons of crude zinc and produced 47,206 tons of sheet zinc.

### Piedras Verdes Disseminated-Copper Zone

BY S. L. PEARCE \*

In July, 1909, through the efforts of C. W. Botsford, engineers in close touch with the Calumet & Hecla mine visited the Alamos district, Sonora, Mexico, and examined the Piedras Verdes copper zone, 12 miles northwest of Alamos. As a result of this investigation, representatives of Boston copper interests and others were soon in the field for properties. Lewis A. Dunham, representing the Seeley W. Mudd interests, secured through Pearce & Pearce, options on 2000 acres and denounced 1000 acres more. Messrs. Moody, Hardy and Harrington, of Boston, secured 1200 acres and Pearce & Pearce, 1400 acres.

#### GEOLOGICAL FEATURES

This zone is about seven miles long and from one to two miles wide. Fully 60 per cent. of this area shows leached red schists with stains of copper carbonates on the surface. There is a series of quartzite strata cutting through the zone from northwest to southeast, passing through the center and departing about 25 deg. from the strike of the zone. These strata are from 10 to 30 ft. in width, nearly parallel, and dip about 65 deg. to the southwest, and it was along these that the former owners had prospected for high-grade silver and copper ores.

The zone is practically within a granite basin, having its greater axis extending from south 76 deg. west to north 76 deg. east, and is ideal in every respect for the retention of the leached copper contents of the sulphide zone. The contacts are principally with granite, though limestone is found on the south and southwest, while the foothills of the Alamos mountain range, jutting in from the south, near the center, are mostly of rhyolite. Numerous diorite intrusions project into and through the schist, and at one or two places small belts of mineralized porphyry are noted.

The Alamos branch of the Southern Pacific railroad passes within three miles of the property on the south and the Mayo river is about the same distance to the north.

Prior to Mr. Botsford's examination, the property had been rejected for the reason that an adit cutting the quartzite strata from 500 to 700 ft. in the hill

\*Mining engineer, Alamos, Sonora, Mexico.

and at a depth of about 150 ft. from the surface had encountered much iron pyrite in the quartzite. Between the strata the copper was oxidized, but not leached, leading to the conclusion that the zone had not yet leached to the extent of producing a zone of secondary enrichment in depth. At one point the Conglomerado shaft had been sunk, near the north line of these strata. It passed through the extreme footwall of the quartzite belt at the 250-ft. level and entered the schist, carrying 3 to 4 per cent. copper, as chalcocite.

#### RESULTS OF DEVELOPMENT BY CHURN DRILLS

In December, Mr. Mudd started the first drilling and to date has driven five holes along the strike of the quartzite strata. These holes range between 350 and 600 ft. in depth. While the results have not been announced, it is known that the existence of a body of low-grade ore has been proved, and that the theory of Mr. Botsford has been practically demonstrated. The general average of the borings has been less than 2 per cent. copper, but taking into consideration the fact that fully 40 per cent. of the borings and samplings have been in the quartzite, and that not over 50 per cent. have been in the actual mineralized schist, the results appear satisfactory and indicate that the deposits outside of the quartzite belt will show 3 per cent. copper.

Following the above conclusions, the Lewishons and Mr. Wright, of the Miami Copper Company, have secured the Pearce holdings and are now preparing to drill the ground. This property, on the western slope of the zone, has less of the quartzite, and it is expected will give more uniform results.

### Heroult Furnace Licensees in America

There are three American licensees under the Heroult electric furnace patents in the United States. They are the Halcomb Steel Company, Syracuse, N. Y.; the Firth-Sterling Steel Company, McKeesport, Penn., and the United States Steel Corporation. The licenses to the last named interest permit the operation of a considerable number of electric furnaces at its various plants. Under their provisions, one 15-ton Heroult furnace is now in continuous operation at the South Chicago works of the Illinois Steel Company and another of the same capacity is nearing completion at the Worcester works of the American Steel and Wire Company, to run in conjunction with a basic open-hearth furnace. A number of additional furnaces are contemplated, but they will probably be larger than the 15-ton type.

# The Petroleum Fields of the United States

Position of Oil Depends upon Quantity of Water in the Strata; Oil Not Always Found With Gas; Organic Theory of Origin Most Tenable

BY W. G. BURROUGHS\*

The six great oil provinces of the United States are the Appalachian, Lima-Indiana, Illinois, Midcontinental, Gulf and California fields. Minor occurrences of petroleum are found in numerous other States.

The origin of the oil in all of these fields is probably the same. Of the many hypotheses advanced, the organic origin of petroleum is based on the soundest geologic facts. The hydrocarbons are found in large quantities, save in one instance, in rocks of sedimentary character. No matter where sediments are deposited, if they inclose animal or vegetable matter, bitumens may be produced. "The presence of water, preferably salt, the exclusion of air and the existence of an impervious protecting stratum of clay seem to be essential conditions toward rendering the transformation possible. Seaweeds, mollusks, crusta-

however, not to take for oil the iridescent scum of iron oxide which often appears on stagnant water in a country whose soil is strongly colored with limonite.<sup>2</sup> (2) At shallow depths an asphaltic substance is sometimes found impregnating the soil. (3) Escape of gases, which is the most common of all evidences. To distinguish between gas from petroleum and other kinds of gases, it must be noticed whether the bubble of gas on breaking in water leaves an oil film. If it does so, it may be regarded as evidence that the gas contains petroleum vapor and is therefore the kind sought.<sup>2</sup> Oil in economic quantities may not be below, however, as it is not always found where gas is. (4) The escape of hydrogen sulphide, incrustations of sulphur and "sour waters," are phenomena often associated with the petroleum fields. Low mounds of the spindle-top

efficient to overcome the friction, such as structural terraces or benches. In porous rocks completely saturated, it will be in anticlines or along level portions of the structure. Where the area of porous rocks is limited, the accumulation will occur at the highest point of the porous medium; and where areas of impervious rocks exist in a generally porous stratum, the accumulation will take place below such impervious stop, which is really the top limit of the porous rock. In porous rocks partly filled with water, the oil accumulates at the upper limit of the saturated area. This limit of saturation traces a level line around the sides of each structural basin, but the height of this line may vary greatly in adjacent basins and in different sands of the same basin.

Partial saturation is the condition most generally found in the Appalachian field. The most likely places, however, for the oil to occur is upon structural terraces or levels, as these are favorable<sup>4</sup> to accumulation in both dry and saturated rocks.

When the petroleum occurs in synclines, there must be water in the rock just below the oil to get it in paying quantities; for if the rock is dry the oil will not be forced into the well, unless by the gases which it may contain.

The approximate distillation products<sup>5</sup> of the crude oil obtained from this field are as follows: Naphthas, gasolene, benzine, etc., 12 per cent.; illuminating oil,<sup>6</sup> 67; lubricating oils (including grease), 12½; gas oil and fuel oil (including acid oil, asphaltum oil and asphalt), 4; paraffin wax, 2 per cent.

The oils of this field are practically free from asphalt and sulphur.<sup>2</sup> In Kentucky and Tennessee, however, the oil varies so distinctly within short distances that it frequently resembles the sulphur oils of the Lima-Indiana field. The gravity of Pennsylvania oil is 46.2 to 42.6 deg. Baumé.

The production of the Appalachian field, including the States of Pennsylvania, New York, West Virginia and southeastern Ohio, Kentucky and Tennessee in 1907<sup>6</sup> was 25,342,137 bbl. of 42 gal. each. Production in 1908,<sup>7</sup> not including Kentucky and Tennessee, was 24,240,000 bbl.; in 1909,<sup>8</sup> 25,394,200 bbl. The amount obtained from Kentucky and

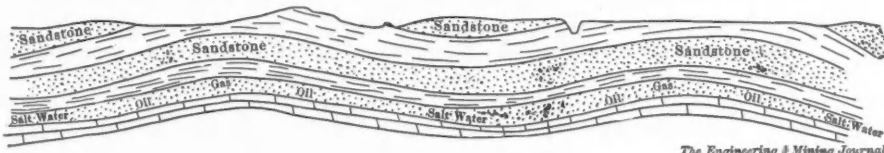


FIG. 1. RELATIVE POSITIONS OF GAS, OIL AND SALT WATER IN FOLDED STRATA

ceans, fishes and even microscopic organisms of many kinds may contribute material to the change.<sup>11</sup> This change is accomplished by a process of slow distillation of the organic matter.

That petroleum varies in different fields<sup>1</sup> is accounted for by the fact that in some regions the original material may have been plant, in other areas animal remains, thus producing hydrocarbons of different character. The different petroleum products thus produced in the various fields are those principally paraffins, naphthenes and nitrogenous or sulphureted oils.

The oil first appears in a state of dissemination, but collectible in economic quantities. It "must gather in proper channels, moved by gravitation or by hydrostatic pressure of waters behind or below it, or by the pressure of dissolved and compressed gases; and accumulate in porous rocks or cavities under layers of impervious material."<sup>12</sup>

The surface indications of petroleum common to oilfields in general are: (1) A seepage of oil, which is the best sign of its presence. Care must be taken,

type are characteristic of the occurrence of oil in the Gulf field.

## THE APPALACHIAN FIELD

The Appalachian field extends from western New York<sup>3</sup> in a general southwesterly direction along the western side of the Allegheny mountains, through Pennsylvania, eastern Ohio, West Virginia, into Kentucky and Tennessee. Although some petroleum occurs in conglomerates, the rocks from which the greater part of the oil is derived are principally sandstones. These sandstones extend in age from the Allegheny formation of the Pennsylvanian nearly to the base of the Devonian.<sup>4</sup>

Referring to Fig. 1, whether the oil will be in the syncline, near the top of the anticline or at some intermediate point, will depend upon the degree to which the strata are saturated with water.

In dry rocks<sup>4</sup> the principal places of accumulation of the oil are at or near the bottom of synclines, at the lowest point of the porous medium, or at any point where the slope of the rock is not suf-

\*Formerly professor of geology, Kendall College, Okla., 129 North Professor street, Oberlin, O.

<sup>1</sup>Bull. U. S. Geol. Surv., No. 330, p. 640.

<sup>2</sup>Bull. U. S. Geol. Surv., No. 282.

<sup>3</sup>Mineral Resources, 1907, p. 352.

<sup>4</sup>Bull. U. S. Geol. Surv., No. 318.

<sup>5</sup>ENG. AND MIN. JOURN., Feb. 6, 1909, p. 297.

<sup>6</sup>Mineral Resources, 1907.

<sup>7</sup>ENG. AND MIN. JOURN., Jan. 9, 1909.

<sup>8</sup>ENG. AND MIN. JOURN., Jan. 8, 1910.

Tennessee in 1907<sup>9</sup> was 820,844 bbl.; in 1908,<sup>8</sup> 1,250,000 bbl.; in 1909,<sup>8</sup> estimated at 1,250,000 barrels.

#### THE LIMA-INDIANA FIELD

The Lima-Indiana field includes the northwestern part of Ohio and a strip in the middle of Indiana.<sup>3</sup> The oil occurs mainly in the dolomitic Trenton limestone of the Ordovician, a section of which is shown in Fig. 2, having accumulated in anticlines.<sup>9,10</sup> It should be noted that the oil is only in those parts

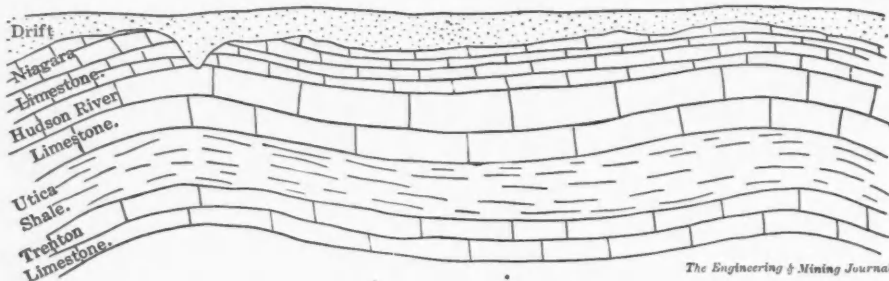


FIG. 2. SECTION OF INDIANA OIL AND GAS FIELDS

of the limestone that have been changed to dolomite. The reason for this is that when an ordinary limestone of calcium carbonate is changed to the limestone containing magnesium, which is called dolomite, the resulting rock is porous, for a crystal of dolomite does not take up so much room as a crystal of lime. In the spaces thus left, the petroleum was able to collect. The Lima-Indiana field yields petroleum having such a high per cent. of sulphur that the oil is subjected to a special treatment to free it from this element.<sup>3</sup>

The distillation products<sup>5</sup> are: Naphthas (gasolene, benzine, etc.) 11½ per cent.; illuminating oil, 43; lubricating oil, 15; gas oil and fuel oil, 25; paraffin wax, 2 per cent. The gravity of Ohio oil is 42.8 to 32.5 deg. Baumé.

The production in 1907<sup>6</sup> was 13,121,094 bbl.; in 1908,<sup>8</sup> 7,287,000 bbl.; in 1909,<sup>8</sup> 6,192,000 bbl. The maximum production<sup>11</sup> of this field from 1902 to 1907 was in 1904, when it produced 24,689,184 barrels.

#### THE ILLINOIS FIELD

In the Illinois field the oil comes principally from eight or ten separate pools in the southeastern part, though small isolated pools have been developed in other places in the State. The oil-bearing rocks are generally sandstones or sandy shales, such as are always found in the coal measures, all being Pennsylvanian in age, with the exception of the Kirkwood sand, which is found in the Chester formation of the Mississippian.<sup>12</sup> In

<sup>9</sup>Thirty-first Annual Report, Dept. of Geology and Natural Resources, Indiana.

<sup>10</sup>Economic Geology, Geological Survey of Ohio, Vol. VIII, 1906.

<sup>11</sup>Mineral Resources, 1907, p. 370.

<sup>12</sup>Economic Geology, Bain, Vol. III, Aug.-Sept., 1908.

the Westfield pool, however, part of the oil is found in a coal-measure limestone, locally altered to dolomite. This occurrence is particularly striking in view of the fact that none of the similar coal-measure limestones are known elsewhere in the State to be magnesian. Indeed, these limestones are characteristically nonmagnesian.<sup>12</sup>

The general structure of the field in southeastern Illinois is anticlinal. This structure, as elsewhere, is an important condition to the accumulation of the oil,

minor arches also being important. The sides of the arches<sup>12</sup> under which the individual pools of gas and oil here occur, if plotted to scale, are not too steep to form thoroughly practicable railway grades.

In an analysis<sup>6</sup> of samples taken from 34 wells in the Illinois field in 1908, the oils range in gravity from 39.5 deg. in the deep wells (1500 ft.) to 22.3 deg. B. The oils contain small percentages of sulphur; in the extreme northern part of the field the sulphur runs no higher than 0.5 per cent., and farther south the aver-

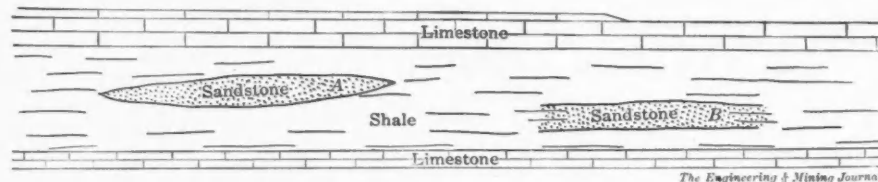


FIG. 3. MIDCONTINENTAL FIELD, SHOWING DISAPPEARANCE OF SANDSTONE BEDS

age is about 0.25, the oils being taken as nonsulphur.

The average for the State of the samples taken was 13.2 per cent. distilling below 150 deg. C., while the illuminating oil averaged 31.2 per cent. Nearly all the oils contained considerable proportions of paraffin and were practically without any asphalt.<sup>6</sup>

The product in 1907<sup>6</sup> was 24,281,973 bbl.; in 1908,<sup>7</sup> 38,844,899 bbl.; in 1909,<sup>8</sup> 29,500,000 bbl. This field has had a phenomenal growth, for in 1905<sup>6</sup> the production was only 181,084 barrels.

#### THE MIDCONTINENTAL FIELD

The Midcontinental field comprises southeastern Kansas, Oklahoma and northern Texas. The important accumulations of oil occur in disconnected lenses or beds of sandstone at various horizons

in the Cherokee shale formation of the Pennsylvanian series.<sup>13,14</sup> Of these sandstone beds there are two classes<sup>11</sup> in the Cherokee shale: (1) A lens-shaped deposit (see Fig. 3) of sandstone which, as it thins out, finally ends abruptly, and the shale begins, there being no grading of the sandstone into the shale. The reason for this is that the lens was formed when only sand was being deposited. (2) A sandstone which grades into the shale. This type of deposit was formed at a time when both sand and mud were being laid down, according to the varying strength of the currents, which at one time were able to carry sand, at another only mud. The first class of deposit is apt to extend for longer distances than the second type, which varies from place to place in an extremely irregular manner.

"That these sand lenses and patches were laid down along the pre-Cherokee shore lines, is strongly suggested by the linear grouping of known pools into belts, the discordance of such belts with the strike of outcropping rocks and the parallelism of these belts with the pre-Cherokee shore lines. If this be the fact, the pools may, in general, be expected to develop greatest length in a north-south direction, thus explaining a characteristic of the known pools. Furthermore, the upper contour of the thickened lenses of sandstone determines the attitude of the succeeding deposits, developing therein a structure which may likewise influence the distribution of oil and gas. For instance, the rapid thickening toward the west of the sandstone lentil in the Labette shale in the vicinity of

Coody's bluff, might locally counterbalance the normal westerly dip, producing a depositional feature in the overlying sediments akin to a structural terrace or arrested anticline. Sandstones overlying an oil-bearing sand of pronounced lens shape might also be oil bearing over the same area."<sup>15</sup>

Up to November, 1908, not one-tenth of the probable oilfield of the State of Oklahoma had been touched, and not one-tenth of what has been proved productive is yet developed.<sup>16</sup> According to this estimate, not more than 1 per cent. of the State's oil and gas has been developed.

Distillates<sup>5</sup> from the Midcontinental oil

<sup>13</sup>Bull. U. S. Geol. Surv., No. 296.

<sup>14</sup>Bull. U. S. Geol. Surv., No. 238.

<sup>15</sup>Bull. U. S. Geol. Surv., No. 340.

<sup>16</sup>Bull. Oklahoma Geological Survey, No. 1.



are: Naphthas, 11 per cent.; illuminating oil, 41; lubricating oils, none; gas oil, 25; fuel oil, 20; paraffin wax, none. The gravity of Kansas oil is 37.3 to 28 deg. Baumé.

The production of petroleum, including northern Texas, in 1907<sup>18</sup> was 46,846,267 bbl. In 1907<sup>19</sup> Oklahoma produced 44,300,149 bbl., while Kansas produced 1,633,500 bbl. In 1908<sup>20</sup> the output of oil from Kansas and Oklahoma was 50,741,678 bbl.; in 1909<sup>21</sup> the output of oil from these two States was 46,826,196 barrels.

THE GULF FIELD

Geographically the Gulf field includes all petroleum-producing areas in Texas and Louisiana. The rocks containing the oil are either sandstones or porous limestones, being overlain mainly by an impervious capping of clay<sup>22</sup>. Fig. 4 shows an ideal section of this field. The oil is buoyed up by the ground water and in its upward movement finds innumerable

ing the form of a lens, concave below and convex above." The probability is that it is due to a combination of these two ways.

The age of the beds overlying the oil is uncertain. The horizon of the oil, however, is not older than late Miocene, and the topmost beds are very recent. Rocks and minerals closely associated with the oil and the presence of which is peculiarly characteristic of the mounds which yield oil or show close structural similarities to the oilfields, are dolomite, sulphur, gypsum, salt and pyrite with associated salts.

"There is some reason for thinking that these mound structures are ranged along lines of slight crustal deformation of disturbance. If such lines exist they probably trend northeast and southwest."<sup>22</sup>

"Extending from southern Arkansas through Texas and forming a belt in which lie the cities of Sherman, Dallas, Austin and San Antonio, are the Upper

The petroleum from Corsicana and other parts of the northern Texas field are lighter and contain less sulphur<sup>23</sup> than that from the Gulf district. The distillate products<sup>24</sup> of Corsicana oil are: Naphthas, 7 per cent.; illuminating oil, 50; lubricating oil, none; gas oil, none; fuel oil, 40; paraffin wax, none.

The production of the Gulf field, including the oilfields of Louisiana and coastal Texas (northern Texas excepted), in 1907<sup>25</sup> was 16,410,299 bbl.; production in 1908<sup>26</sup> for Texas, 11,206,464 bbl.; for Louisiana in 1908<sup>27</sup>, 6,833,130 bbl.; for Texas in 1909,<sup>28</sup> 9,593,000 bbl.; for Louisiana in 1909<sup>29</sup>, 3,192,000 barrels.

CALIFORNIA OILFIELDS

In California there are a number of productive fields, all lying south of the latitude of San Francisco, although there are minor occurrences north of this latitude.<sup>30</sup> The oil is found in sandstones, conglomerates and zones of fractured shale or flint offering interspaces in which the oil can gather. This structure is

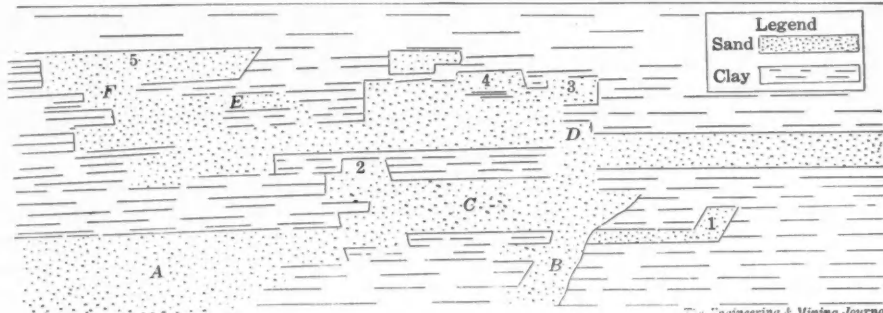


FIG. 4. IRREGULAR SANDS AND CLAYS, TEXAS-LOUISIANA FIELD.

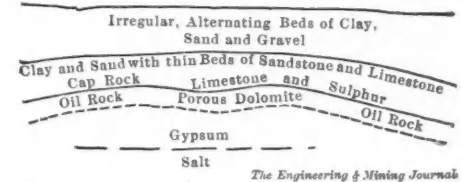


FIG. 5. SECTION OF SPINDLETOP OIL POOL

small pockets or traps in which it comes to rest. It thus may reach the surface, or be caught in these pockets of porous rock and be retained in large enough quantities to be of commercial value. Oil occurs in limestone which is either porous or cavernous or both. Not all porous limestones contain oil, however.

"Beneath the reservoirs in the sand are usually thick clays, and beneath the porous limestone are various impervious formations among which clay, marl and gypsum are common. In no case can it be shown that the beds beneath the oil are less impervious than those above."<sup>32</sup> In all probability the oil entered the reservoirs from the sides.

A striking topographic peculiarity of some of the oilfields are low mounds of which Spindletop (Fig. 5) is a good example. This mound is but 10 ft. above the adjacent prairie and in area but little more than 200 acres. The oil occurs in a dolomitic limestone to which the far deeper wells of the surrounding prairie have found no formation to correspond. The two best hypotheses are that either "the rock may be horizontal outside the limits within which it is shown, but have its character changed within a narrow space to that of the ordinary Coastal Plain deposits," or that it "may thin out and disappear, the entire formation hav-

ing the form of a lens, concave below and convex above." The probability is that it is due to a combination of these two ways.

The gravity of Corsicana oil which is refined is 38 to 39 deg. B. The distillate products<sup>33</sup> of the Gulf fields are: Naphthas, 3 per cent.; illuminating oil, 15; lubricating oils, 6; gas oil, 45; fuel oil, 28; paraffin wax, none. The gravity of Beaumont, Texas, oil is 24.8 to 31.1 deg. B., and that of Sour Lake oil is 24.7 to 16 deg. Baumé.

The petroleum which occurs near the Gulf contains quite a percentage of sulphur, chiefly as hydrogen sulphide; but the sulphur is easily removed by steam before the oil is used. This petroleum is important as a fuel oil, and, being situated near the coast, it can readily be exported. The value of the gasoline obtained from this petroleum is considerable, for although the per cent. of gasoline derived is small, about 3 per cent., it is a better solvent than that from other fields.<sup>35</sup>

<sup>18</sup>Bull. U. S. Geol. Surv., No. 184.

<sup>19</sup>Mineral Resources, 1907, p. 353.

shown in Fig. 6. There is also one noteworthy occurrence of oil in crystalline schist.

The petroleum occurs in connection with anticlines, monoclines, local lenses of sand or gravel, associated with faults and in synclines. The principal formations from which the oil is obtained are the Monterey (Upper Miocene), Fernando (Upper Miocene or Lower Pliocene), Tejon (Eocene), Vaqueros (lower Miocene), Santa Margarita (Upper Middle Miocene), and the Jacalitos (Upper Miocene).

In the Santa Maria district the oil is always intimately associated with gas.<sup>36</sup> This oil exhibits a striking tendency to migrate upward, in spite of the fact that whatever water is present occurs, in all but four wells, near the surface, or at least considerably above the oil-producing zones. This tendency of the oil to migrate is accounted for by the associated gas.

An example of the oil occurring in monoclines is found in the Westside and Kreyenhagen fields, in which water is associated with the oil.<sup>37</sup> Here the oil is prevented from escaping to the surface, not by an overlying impervious formation, but by the heavy residual hydrocarbons which were left when at the first period of formation of the oil it rose to the surface, the lighter compounds in the petroleum

<sup>30</sup>Bull. U. S. Geol. Surv., Nos. 213, 321, 322.

<sup>31</sup>Bull. U. S. Geol. Surv., No. 357.

being evaporated and escaping into the air. These hydrocarbons thus seal the outcropping porous oil strata.

In Placerita cañon, five miles east of Newhall, is an area of oil land of insignificant size and yet one of the most remarkable oil territories in the world. The oil occurs in crystalline schist.<sup>21</sup> Under this schist is the San Gabriel granite, and overlying the schist, at a short distance from the oil wells, are rocks which are thought to be of the Fernando formation. "The schist in which the oil occurs is micaceous and granitic, con-

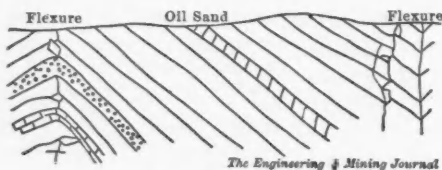


FIG. 6. SECTION IN LOS ANGELES OILFIELD

spicuously banded and greatly contorted. The presence of oil under conditions similar to those that exist here is perhaps unknown in any other part of the world. The oil itself is almost a naphtha, white in color, and having a gravity of 50 to 60 deg. B. It may be that the oil is of later origin than the rocks from which it is derived, or, in any event, that it was for a time stored in another reservoir, perhaps of Vaqueros, possibly even of Fernando age. It is possible that from such a reservoir the light oil, already from some cause separated from the heavy oil, may have found its way between the two formations and penetrated the crystalline rocks through one of their fractured zones.<sup>22</sup>

The distillation products<sup>5</sup> of California crude petroleum are: Naphthas, 6 per cent.; illuminating oil, 18; lubricating oils, 1½; gas oil and fuel oil (including acid oil, asphaltum oil and asphalt), 72; paraffin wax, none. The gravity of California oil is 35 to 12.3 deg. B.; that of oil from the crystalline schist is 50 to 60 deg. Baumé.

In 1906 the amount of oil used as fuel in California was greater than the entire production of the State for the year; the production in 1906 being 33,098,598 bbl. The production in 1907<sup>6</sup> was 39,748,375 bbl.; in 1908,<sup>7</sup> 45,000,000 bbl.; in 1909,<sup>8</sup> 58,250,300 barrels.

#### THE COLORADO FIELDS

In Colorado the principal occurrences of oil are in sand lenses in an anticlinal fold of the Mancos shale (Cretaceous) as shown in Fig. 7; in the more arenaceous beds within the Pierre formation (Cretaceous) upon a structural slope; and along amonoclinal fold of the Fort Pierre shales (Cretaceous), sometimes in the sandier beds and sometimes in the shale itself.<sup>23</sup>

<sup>21</sup>Bull. U. S. Geol. Surv., No. 309.

<sup>22</sup>Bull. U. S. Geol. Surv., Nos. 260 and 350.

<sup>23</sup>Bull. U. S. Geol. Surv., No. 225.

The distillation products<sup>5</sup> of the crude petroleum of Colorado are: Naphthas, 3½ per cent.; illuminating oil, 35; lubricating oils, 3; gas oil, none; fuel oil, 55; paraffin wax, none. The gravity of Rangely oil is 44 deg. Baumé. The production<sup>7</sup> in 1907 and 1908 was 400,000 bbl. in each year; in 1909,<sup>8</sup> 500,000 barrels.

#### ALASKA AND OTHER FIELDS

The petroleum fields of Alaska are Controller bay, Cape Yaktag, Cook inlet and Cold bay, all these fields being on the southern coast of Alaska and situated on tidewater.

In the Cape Yaktag field, in which the geological occurrence of the oil has been determined, it is found associated with rocks consisting of shales with interbedded sandstone and limestone, the structure being anticlinal.<sup>23</sup> In the Controller Bay<sup>24</sup> field the structure is extremely complex and difficult to interpret.

"West of Katalla the seepages of oil are associated with metamorphic rocks, the oil coming to the surface either through the joints and bedding or cleav-

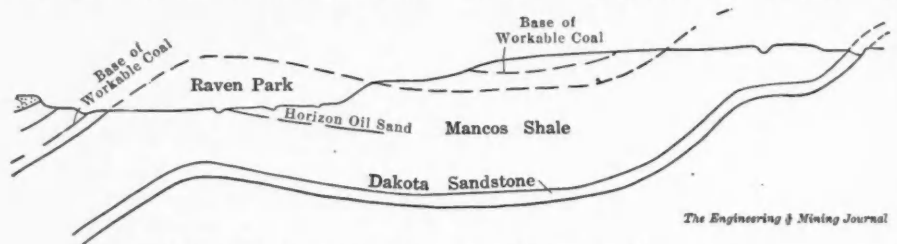


FIG. 7. SECTION OF RANGELY OILFIELD, COLORADO

age planes of the slate and graywacke, or through superficial deposits which probably overlie such rocks.<sup>24</sup> The explanation for this is probably that the metamorphic rocks, which are known to be separated from the Tertiary shales by a fault, are overthrust upon the shale along a fault plane of low hade, and that the oil at the seepages is coming through the metamorphic rocks from the underlying shales.<sup>24</sup> The petroleum of the region is a refining oil of high grade.

Other fields in which small quantities of oil have been produced are Wyoming, Missouri, Michigan and southwestern Utah. Of all these smaller fields, including Colorado and Alaska, Wyoming gives most promise for the future. In 1908<sup>9</sup> it is estimated that Wyoming produced 13,000 bbl.; in 1909,<sup>8</sup> 15,000 barrels.

Oil also occurs in Montana, Washington, Oregon, Idaho and Nevada.<sup>15</sup>

#### SUMMARY

Oil-bearing rocks range in age from Ordovician to the most recent. In the eastern States these rocks are chiefly Paleozoic in age; in the western and southern States, of Post-Carboniferous

<sup>24</sup>Bull. U. S. Geol. Surv., No. 314.

age. The oil occurs in sandstones, dolomitic limestones, sandy shales, shales, conglomerates, gravel, flint, slate, graywacke and crystalline schist. The structures of the rocks from which the petroleum is derived are anticlines, synclines, structural terraces and benches, arrested anticlines, lenses, monoclines and in rocks associated with planes of faulting.

#### Treatment of Antimony Ores Containing Arsenic

H. L. Herrenschmidt, of Paris, France, in U. S. Pat. 948,545, Feb. 8, 1910, describes a process of treating antimonious ores containing arsenic, whereby the antimony is recovered free from arsenic in whatever proportions the latter may be present. The process is based essentially on the dry treatment of the coarsely crushed ore, and on the wet treatment of the pulverulent portion.

In the dry treatment the ore is roasted in a furnace, so as to give off a mixture of oxide of antimony, arsenious acid and sulphur dioxide. The roasting is done at a temperature of about 400 deg.

C., preventing any agglomeration of the residue.

#### TREATMENT OF PULVERIZED RAW ORE BY WET METHOD

In the wet treatment, the fine unroasted ore is mixed with an alkaline solvent, charged into an autoclave containing water, and boiled until the pressure reaches four or five atmospheres. The content of the autoclave is discharged into a vat. The liquor, containing antimoniate or sulph-antimoniate of soda, and arsenate or sulph-arsenate of soda, is drawn off. The liquor is then caused to react with the mixture of antimony and arsenious acid from the roasting furnace, thus separating the arsenic. From the arsenical and alkaline liquor obtained in this reaction, the antimony is precipitated by the sulphurous acid resulting from roasting the ores in the furnace.

Besides recovering antimony free from arsenic, the following advantages are claimed: Economy in fuel consumption; cheap construction by the use of cast-iron chambers; and the possibility of collecting the oxides of antimony and arsenic as they are condensed, without interfering with the operation of the furnace.

# A Suggestion to the Coal Mining Industry

If the Operator Were Willing to Drive Entries to Boundary First, and Mine Retreating, There Would Be Greater Recovery and Fewer Fatalities

B Y T. B. B A N C R O F T\*

Time was when very little capital was required to open a coal mine and put it in condition to ship coal. Especially was this the case in drift mines, where \$2000 or even less, would open and equip the mine in an uptodate manner. The single-entry plan prevailed, with its consequent bad ventilation, which was aggravated by the aimless and wandering directions that these entries took. Muscle and pick brought down the coal and the patient but perverse mule hauled it to the surface, where a small tippie of the "before the war" type served for loading it into a five-ton railroad car, or the hull of a canal boat, as the case might be.

The long-suffering canal mule, or a small locomotive, hauling a correspondingly short train of small cars, conveyed the product to the markets, which were mainly local and in near proximity to the place of production. What is known as "slack" formed no part of this product and was hauled out and piled in huge banks as waste, to be added to the great loss of coal inside the mine, by reason of the careless, prodigal and unscientific methods of mining then in vogue. A map of a coal mine did not exist, and to suggest to a mine owner the making of one would have called forth a torrent of invective and abuse because of its uselessness and expense. Anything like statutory control of the industry was unknown until in the late 'sixties—Pennsylvania appointed one mine inspector in the anthracite coalfield. In 1871 occurred the great disaster at the Avondale mine, in that State, whereby 109 miners lost their lives through an explosion of firedamp.

## IN 1872, THE FIRST MINING LAW WAS ENACTED IN OHIO

This aroused the mine workers of Ohio to the necessity of legislation for their own safety and protection in the hazardous occupation in which their days are spent. Agitation in this direction ensued and in 1872 the first mining law was placed upon the statute books of that State. This law fell still born, as it contained no provision whereby anyone, official or otherwise, was specially charged with its enforcement. Further legislation followed from time to time, until 1884, when the basis was laid for the mine department, as it now exists in Ohio. Other States followed suit, and it is believed that every State wherein the mine worker plies his calling now has its laws, more or less stringent, for his protection.

\*Ex-chief Inspector of Mines, Springfield, Ohio.

Coincident with the creation of the mine department of Ohio (though perhaps not by reason of its provisions or their enforcement) began a rapid improvement in the methods of mining and a largely increasing output of product; followed on the part of the railroads by a growth in transportation facilities, made necessary by the changed conditions.

About 1883 came in the rope haulage, which, dispensing largely with mules and drivers, gave more satisfactory results, at less cost to the producer; at the same time the "Mitchell" tippie began to be adopted, which quadrupled the dumping capacity of the old style tippie, under its most favorable circumstances. The year 1884 saw the exhaust fan rapidly taking the place of the furnace, as a better, safer and cheaper form of ventilation; and the mining machine, driven by compressed air, began to make its appearance; while 1887 ushered in electricity as a motive power in mining. Electricity not only runs the mining machines, but it does the hauling, lighting and pumping in the mine, and has contributed more than all the rest in bringing the practical problems met with in coal mining to the acme of perfection in their solution.

In the mining company's office of today will be found a map of the mine showing all the interior workings and the surface boundaries of the property. This map is drawn and extended monthly, as the workings grow, by the mining engineers employed by the company. It is now considered absolutely essential to the proper and intelligent conducting of the business that this map be available for reference whenever required, and the trained engineer, with his assistants, is as much a necessity as the old "bank boss" was formerly.

Going over to the mine, we find the electric plant in a clean, airy building convenient to the opening. This plant supplies power wherever needed and is under the care of a trained electrician. The machinery is too costly and delicate to be entrusted to unskilled or ignorant hands. The haulage system extends from the mouth of the drift, or the bottom of the shaft, to the innermost recesses reached by the entries and is extended, from time to time, as the working faces advance. The best type of electric machines do the mining and drilling; the shots are fired by electricity; the roads and entries are kept scrupulously clean, that the work may not be inter-

rupted by accidents; for, with the large number of men employed and the great daily output, the loss of an hour's time mounts up on the pay roll and makes a large hole in the value of the day's output as well.

If it is a shaft mine, a small dummy engine keeps loaded cars, on the siding at the bottom, constantly moving toward the cage, so that the loaded car passes onto the cage as soon as it lands, bumping the empty car off on the other side, thus avoiding having to go back on the entry for the last cars of the trip, and keeping the hoisting engine going so that there is a constant run of loaded cars going up, with no break except for reversing the engine at the top. To facilitate this, the car never leaves the cage at the top, but is dumped and returned to its position on the cage automatically without a hand being laid upon it. The separate sizes of coal pass to their separate railroad cars, while the dust is carried off by elevators or blown away by a fan.

## THE SMALL OPERATOR IS NO MORE

So quickly can the coal be passed over the tippie to the cars at a modern mine that the writer has seen a train of cars passed under the tippie and loaded while in motion, from the first car to the last, without once stopping the moving train. It is this system, this clocklike regularity, that has enabled the modernly equipped mine to load from 2000 to 4000 tons daily, where its ancient forerunner was unable to do the same in 10 days. The "happy-go-lucky," "come day, go day" method of mining has gone down before modern science, and the spirit of modern commercial economy. The change having once set in, has been rapid and final and with the coming in of the new and the passing away of the old, has passed the "small operator." Verily, his day has gone by.

The pace is set by men with capital sufficient to enable them to take advantage of all labor-saving devices, be they mechanical, scientific, or natural. In the absence of natural advantages, he who enters the field against them must be able to equip his plant with all the appliances of the other. The cost of a modern, uptodate mining plant is so largely in excess of what it formerly was that we may look in the future for the business to be in the hands of men with large means and with resources beyond what we have been accustomed to. It is, perhaps, well that it should be so, as

it makes for the benefit of the mine worker, in that the false spirit of economy so long prevalent among operators, which gave him poor ventilation and exposed him to other risks, because of the cost, will have passed away and the true economy that looks far ahead and sees that in the long run good ventilation, clean roads and proper drainage pays, will have taken its place.

The readiness and ability of the American citizen to grapple with and overcome all obstacles in the way of advancement has, in this case, been supplemented by nature in the endowment of the largest carboniferous deposits in the known world—and they of the best quality, each in its class; while the reward that stimulates to further effort lies revealed to this generation in the demand for our product, about to descend upon us from all points of the commercial world.

#### WE WILL SOON SEND COAL TO EUROPE

Europe, whose mines have been worked for hundreds of years, will soon be looking to us for her supply; in fact, we are already sending to her of our abundance. A prominent operator with mining interests in several States, upon his return from Europe recently, informed me that he could have sold his coal, to be delivered in London, at a price much below that of coal mined in England, and have realized a good profit on the sale. He further said that he could have placed some large contracts but feared to undertake them because of uncertainty as to finding vessels to carry the coal. Here, then, is all that stands between us and an export trade with the world. Can it be doubted that the requisite fleet will be forthcoming in the near future, and are we not on the eve of another great change of conditions in the coal trade?

Nevertheless, and in despite of our immense deposits and our labor-saving mechanical appliances (which mainly tend to an increased output and a corresponding depletion of our resources) we are told our coal supply is limited! And this on the eve of an increased demand upon it, altogether without precedent in the past; and as this paper is being written, the press is burdened with accounts of the holocaust, at Cherry, where upward of 300 men were caught, like rats in a trap, and suffocated, while hundreds of willing rescuers stood around the pit's mouth unable to enter it.

Mining laws have been passed, good, bad and indifferent; some of them have been "more honored in the breach than in the observance," and still disasters follow each other in such terrible frequency and awful increase of victims, that the horror of Avondale, where only 109 were lost, sinks into insignificance when compared with those of the "modern mine."

It is well known to the trade and to

mining engineers, that the percentage of coal lost under the present system of mining is very great. It varies, from local causes, in mines and districts. Large part of it comes from sheer waste and lack of economy; while thousands of acres are lost annually by falls of roof cutting off access to coal as yet untouched, and by robbing the supporting-room pillars in order to save entry driving.

The nation demands—and the mine owner will no doubt agree—that our coal beds be preserved and protected from unnecessary loss; while the mine worker asks that practical and proper means be afforded for the safety of life and limb in his hazardous vocation.

#### THE COAL OPERATOR IS SOMETIMES TOO GREEDY

Hitherto, the custom has prevailed in America, of attacking the coal of the newly opened mine for shipment as soon as the developing entries are sufficiently under cover to warrant it, and I have been in one mine where the rooms had been opened so close to the shaft (in order to get to work at once) that a squeeze was brought upon it, crooking the shaft to such an extent that, within a year after its being sunk, it was almost impossible to get a cage up or down it; there was no other opening to this mine, and in case of accident there could be very little hope of saving the men employed in it. Another case came under notice, where the seam lessened in thickness from 6 ft. to 4 ft. The entries were deflected to follow the thick coal, and the thinner coal was left untouched. Some years after, when the mine was nearly exhausted, an effort was made to take out this coal, once rejected; but it could not be reached, and several hundred acres of the best coal in that State were added to the amount lost under the present system of mining.

It will be self evident to all, be they of the craft or not, that as the entries press forward and development progresses by this method, the entire product of the mine, from its opening until the last pillar is drawn, must pass to the surface through a maze of old workings, left behind with their poisonous exhalations and falls of roof, lack of drainage, heaps of what is known as "gob," breeding "black-damp" in one place and "white-damp" in another; all, perhaps, having been once bratticed off, as required by law, but now (being in an unproducing district) seldom visited by anyone, unless it be by some miner who tears open the barrier for a short cut to another part of the mine; and, be it remembered in this connection, that practically all the men working in the mine are employed at the faces, so called, the point farthest from the entrance, which is frequently miles away.

#### ENTRIES SHOULD BE DRIVEN TO THE BOUNDARY FIRST

In England and on the continent there has long been in use a plan for opening coal mines that is the reverse of that handed down to us by our forefathers, and to which we so tenaciously adhere. I am under the impression that this plan of opening is mandatory, under the English law; but, be that as it may, it consists in driving the entries through to the boundaries of the territory to be attacked before beginning to open rooms and ship coal. This increases the amount required for the initiatory investment, but is the cheaper in every way, in the long run.

Let us compare the two plans in as concise a manner as possible within the limits of this paper; and what is written above in connection with the past and present news items, anent the subject, given by the daily papers, may serve as data showing the imperfections of coal mining as practised by us, and we will pass to the consideration of the foreign method.

In mines opened in this manner, the increased amount of the first and original investment is the cost of driving the entries and of the rails, ties, etc., required by them, for the whole mine; this item exists at present, to be met and liquidated during the life of the mine. Practically we find that the expense attending the adventure from beginning to end, is the same in both cases; the cost of the entries alone being advanced in the foreign mine and there is no other charge to be met save that of interest; which the merchantable coal from the entries themselves will more than care for.

These entries are in the nature of explorations; they permeate the whole proposed territory of the mine, in the direction it is to be worked. If there be a rock fault, a cutting out of the coal, a large body of gas, or any other difficulty to be met, these entries expose it and measures to meet the contingency can be made in time. The floor levels can be taken, and at the lowest point in the mine the sump can be dug and the big pumps located, so as to drain every part of the mine well and properly. The highest point of the roof can also be found, and there can the escapement shaft be sunk with a good, safe stairway up it, to the end that should anything occur to the fan, "natural" ventilation would begin automatically, to the probable saving of many, obliged to rush for the high places, and of others who "follow the air" in such crises, knowing it leads to the air shaft and safety.

#### MINING ON THE RETREATING SYSTEM

All of these entries will be air courses for the ventilation of the mine, and the superficial area of coal exposed by them will be immense. Everywhere over this surface will be met blowers, or leaks, of

the gasses common to coal mines, liberated by the entries or forced out by pressure from behind, to be taken up by the air current and carried away at once, before accumulating and becoming dangerous; and this while the entries are being driven and even before the work of shipping coal begins.

With its advent we find that repairmen are not needed, nor are they likely to be needed to any great extent until the mine is worked out; for the entries stand in solid coal where no weight can affect them, and when the rooms are finished the pillars can be attacked at once. There are no old workings behind us, for we clean everything out as we work back to the entrance, which we do rapidly, for our air is provided for, and the haul becomes shorter daily. There are no old workings between us and daylight, and the pure air from the outside sweeps through the passages by which we escape, should any unexpected accident occur. To some extent our props and ties can be used more than once, and once installed they are always near the next point of need. The rails also can be used again, for those nearest the front will be the least used and the first to be taken up. The rapidity with which the mine can be exhausted will more than compensate for the amount, with interest, made necessary for its development.

Over and above all this we must take into consideration the great saving in coal which would accompany this method of attack. In this instance, Nature has been so prodigal with her gifts to us that we have been reckless from the start and have become too lavish in dissipating our wealth. Notwithstanding, our immense coal deposits and our rapidly increasing output, we are confronted by a demand in the near future, that bids us pause. The time has come when the old waste must cease, and we must turn our attention to the matter of economizing our resources. It has been estimated that by the present method of working we do not get more than 70 per cent., and even lower estimates are on record.

Ohio's coal product for 1908 was 26,287,800 tons. If in the getting of this coal only 10 per cent. were lost, it would amount to 2,628,780 tons in Ohio alone for that year. An article of the *Ohio State Journal*, of Dec. 27, says "the production of coal for the current year (1909) is estimated at 412,000,000 gross tons by the operators of mines that account for 89 per cent. of the national production." It will be seen by this that the coal lost in one year's operations, even at the low and safe estimate of 10 per cent., becomes appalling when the gross tonnage of the nation is considered,

and it behooves us to be up and doing that this wastage of our heritage, with its accompanying mortality, be reduced, if it cannot be altogether avoided.

#### WE SHOULD MINE ON THE RETREATING SYSTEM

There can be no question that by adopting the European method of opening mines we shall have reached the practical limit in conserving our resources and at the same time shall have thrown around the mine worker additional safeguards, and removed most of the present conditions that go to make his occupation hazardous.

Would not a simple statute (State or National) commanding such a system of development, be of more practical service to him than our present mining laws? Under it we would destroy the incipient "germ" and abolish conditions, which, when left undisturbed, lead up to falling roof, generation of poisonous gases which suffocate, explosions of gas which mean sudden death, and the closing up of traveling ways which should have been avenues for escape. To this may be added an increased profit to the operator, as has been demonstrated in two cases, coming under my notice, where this plan was adopted; one in a 4-ft. seam in Ohio, the other in a 6-ft. seam in West Virginia.

## Utilization of By-Product Gases from Coke Ovens

BY HENRY M. PAYNE \*

It is evident that the amount of volatile matter contained in the coal, and the method of coking, will influence the amount and quality of the by-products, but the three principal residuents are tar, sal ammoniac and benzol.

One of the most complete by-product plants in Europe is at Gelsenkirchen, Germany, and has already been described in this JOURNAL, by Prof. Wm. S. Hall, (in June, 1908). Here, in addition to the regular by-products, the company furnishes illuminating gas to the surrounding villages and cities, at the rate of 3½ pfg. (= 1c.) per cu.m., or about 23c. per thousand cu.ft. They furnish 60,000 cu.m. per day or about 21,180,000 cu.ft. which gives the company a net profit of 2½ pfg. per cu.m., or 1500 marks (= \$375) per day.

The original tar is passed through various washing and distilling processes, whose resulting products are principally,

(1) *Carbolic acid* in the crystalline form  $C_6H_5OH$ .

(2) *Anthracene*,  $C_{14}H_{10}$ , which is used for dye-stuffs.

(3) *Toluene*,  $C_6H_5CH_3$ , from which, by oxidation is formed benzoic acid,  $C_6H_5CO_2H$ .

(4) *Creosote*,  $C_{10}H_8(OH)$ , a mixture of carbolic acid, cresylic acid, etc., used as a preservative and antiseptic.

(5) *Naphthaline*, from which  $\alpha$  and  $\beta$  naphthol  $C_{10}H_7(OH)$  are derived, and which are used in the manufacture of coloring pigments.

(6) *Benzol*,  $C_6H_6$ , which differs from the primary by-product benzol, only in the temperature at which it is distilled, and which is commonly known as "65 per cent. benzol" and subsequently worked up into solvent naphtha.

Some of these, as creosote, have been effectually used as timber preservatives; and the tar itself, in various forms as binder for briquetting coal slack, coating for prepared roofing, and as pitch to be mixed with furnace slag in the building of roads. The amount of tar so gathered averages about 7½ lb. per ton of coal.

THE SAL AMMONIAC RECOVERY IS 25 POUNDS PER TON OF COAL

The value of the sal ammoniac will depend largely upon its whiteness, which in

turn, is only to be obtained by the presence of large quantities of steam to keep the saturator constantly in ebullition, and by keeping the solution always alkaline, since the ammoniacal liquor contains distillates which form white ferrous salts, rapidly oxidizing when coming in contact with ferro-cyanides, and forming prussian blue unless kept continuously alkaline.

This high-grade sal ammoniac sells at Gelsenkirchen for 18 marks (= \$4.50) per ton at the works. The amount recovered is about 25 lb. per ton of coal.

Sulphuretted hydrogen is one of the gases which passes off during the manufacture of sal ammoniac, and on account of its odor, it is necessary to reduce this to free water and sulphur, which is done by passing it through Ferric Hydroxide,  $Fe(OH)_3$ .

The benzol, as has been indicated, occurs in the mixture of hydrocarbons, and is separated by passing it through a hydrocarbon oil, by which it is absorbed. Creosote is frequently used for this purpose, on account of its affinity for, and receptivity of benzol.

\*Mining engineer, Morgantown, W. Va.

The process of distillation is known as "fractionation," or the graded distilling of the lighter hydrocarbons, which first pass off at lower temperatures on up to the heavier ones, as the temperature increases. This creosote, or other hydrogen oil, is repeatedly used until it has absorbed so much naphthaline as to be unfit for further service.

#### BENZOL MIXED WITH ALCOHOL IS USED AS FUEL FOR HAULAGE MOTORS

Each ton of coal yields from 3 to 3½ gal. of 65 per cent. benzol. This benzol is then refined to various grades, depending on the purposes to which it is to be put. Most of it, in Germany, is used in combination with denatured alcohol, as a fuel for haulage motors. The reasons for this combination are that the waste gases of the benzol alone are not only dangerous, but decidedly unpleasant, and

rapidly vitiate the ventilation, whereas by using from 66 per cent. to 75 per cent. denatured alcohol, the odor after a gasoline haulage motor has passed, is scarcely noticeable.

These haulage motors weigh from 2 to 5 tons, developing 8 to 18 h.p. and costing from \$1750 to \$2125. The cost of operation is said to be from 2½ to 4c. per ton-mile, as compared to 12c. per ton-mile under the same conditions, with horses.

The specific gravity of the benzine made from petroleum is greater than that of the benzol made from coke-oven by-products, and the latter is preferable for haulage purposes, giving less odor to the waste gases. The lower the temperature of distillation, the better the grade of benzol.

In the open German market the best grade of by-product benzol costs 18 marks per 100 liters, or about 17c. per

gallon, while the coal companies operating by-product plants produce it at a cost of 7¼c. per gallon. The grade here spoken of, is the 65 per cent. benzol refined to 90 per cent., and commercially called "gerinnigdesbenzol."

This benzol when treated with nitric acid becomes nitro-benzene, which when reduced, gives aniline, or amido-benzene, and from this base, by the use of acetic and other acids, acetanilid and the other coal-tar-derivative-drugs are prepared.

I am indebted to Herr Direktor G. A. Meyer, Herr Berginspektor Ackermann, and Herr Direktor Lindenberg, of the Hibernia, Königin Luise, and Gelsenkirchen Bergwerks, respectively, for courtesies extended and information furnished, and to Herr Meissner, Geheimer ober Bergrat, of Berlin, for placing at my disposal many facilities not otherwise obtainable.

# Explosions in Coal Mines

## SPECIAL CORRESPONDENCE

The coal-dust question is one to which much careful thought has been given by the members of the British Royal Commission on Mines, whose second report was recently made public. They indicate that much may be done to prevent the accumulation of dust in mines. Directing attention to the large amount of the finest dust that enters the shaft from the screens, they suggest that means should be taken to prevent this by removal of the screens to a more distant point, or by drawing off the dust or otherwise. They also point to defective cars as being responsible for causing a considerable amount of dust, and in all dry and dusty collieries the adoption of dust-tight cars is recommended. Further than this, care should be taken in loading the coal into cars to prevent the scattering of pieces of coal along the roadways; spraying of coal should be carried out where practicable if fast haulage is the rule.

#### COAL DUST THE DANGEROUS FACTOR

The danger of the presence of gas in mines is not underestimated, but mining authorities in Britain have been convinced by experience that in the fine particles of coal dust there lurks a danger far greater than may be attributed to fire-damp. The inquiry into the West Stanley (county of Durham) holocaust resulted in the verdict that the 169 victims lost their lives by reason of an explosion of coal dust. It was coal dust that caused the Courrières explosion—the greatest in the world's history of mining, destroying 1100 lives. This French disaster, upon the authority of a British Home Office report, emphasizes the risk now generally admitted to exist in dry

and dusty mines of great loss of life in case an explosion is initiated. In some of the larger mines in Britain, the report suggests the loss of life might equal that of Courrières if an explosion took place when the maximum number of men are underground, and the declaration is made that "the only certain method of preventing loss of life would seem to be to render the mines incapable of being the scene of widespread dust explosions by watering or otherwise preventing the accumulation of dry dust in the roads and workings."

Some years ago with the growing recognition of the dangers of coal dust, the explosives for blasting purposes in mines were revised as a partial if not complete remedy. The well known Woolwich test was enforced, gunpowder being banned under certain conditions, and safety explosives placed upon the "permitted" list. A saving of life has been attributed to the application of the new conditions attending the employment of dangerous explosives, but the view gained currency that the "permitted" explosives were flameless, and not until the Departmental Committee on Bobbinite issued its report was the fallacy clearly combated. This committee declared that "there is no such thing as a completely safe explosive; that is to say, there is no explosive which under any conceivable circumstances, might not ignite gas or dust, or a mixture of gas or dust."

This report further indicated that the Woolwich test passes explosives which would be discredited under the Continental test, while the latter allows to be used in French and German mines explosives which are looked upon with dis-

favor at Woolwich. The commissioners say that in practice it is impossible to resist the conclusion that the class of explosives of which Bobbinite is a prominent and good example, is upon the whole, more suitable for coal getting than the more detonant explosives, but it is also true that this group is distinctly more favorable to the ignition of gas and dust when insufficiently confined in a shot-hole.

#### PERMITTED EXPLOSIVES MAY BE DANGEROUS

They then proceed to say that the results of practical working do not invariably confirm the Woolwich test, one reason for this appearing to be that the active chemical change involved in the explosion is completed before the containing walls have yielded, and consequently the still exploding material may come into contact with inflammable atmosphere outside the shot-hole. Three ways in which this may occur are indicated: (1) The charge may have been considerably overestimated; (2) the stemming may be inferior in quality either from being too soft, or from its being material which does not bind and is, therefore, easily blown out, or it may be deficient in quality with the same result; (3) unsuspected fissures may exist in close proximity to the shot-hole. The commissioners suggest in their report that the tests used by the explosives department should no longer consist of the single test as at Woolwich, but should include a more severe test, probably on the lines used on the Continent. They also think it would probably be desired to add a testing station for testing coal dust and safety lamps.

According to particulars collected for the present Commission on Mines, there were at the mines in Great Britain 183 fatal explosions causing 720 deaths in the 10 years 1896-1905. Of the total number, the influence of coal dust in extending the explosion was remarked in 21 cases, including the more serious disasters. The death roll in the latter was high, amounting to 476 out of the 720 deaths. In the mines, the making of coal dust is inevitable, and where it cannot be removed something should be done to reduce to a minimum the danger of its becoming the central factor in a fiery blast destroying the mine and its workers.

After an experience extending over more than three decades, R. Donald Bain, the Durham mines inspector, favors a system of watering the mines as a means of preventing colliery explosions. When before the commission he gave it as his opinion that the Wingate (Durham) explosion, destroying 25 lives in 1906,

the most likely to maintain the mines in a condition of safety. In the absence of discipline, the destruction of the mine is ever imminent and calamity may overtake the workers. It may be appropriate to recall the reminder of the Liverpool mines inspector, Henry Hall, "that the labors of scientific experts will be of no avail to avoid disaster unless the workers submit to strict discipline and cheerfully comply with the regulations for their safety." This, of course, applies also to the management, for as W. H. Pickering, the Yorkshire mines inspector, says, "Discipline, or the want of it, begins at the top, with the chief in command."

From time to time the views of recognized British experts will be summarized, in relation to this and other important mining questions, in the light of evidence laid before the Royal Mines Commission and other channels of information. In the meantime, as some big disasters have overtaken the mining communities of America in recent times, the opportunity is taken of appending a list of holocausts which have killed five score or more British workers during the last half century. Contemplation of the list, while revealing the horrors attending explosions, may also strengthen the resolutions of those who "dig for coals" to conform to all known safety measures.

**COLLIERY NOTES**

In testing the practical efficiency of a batch of detonators, a simple method is to fire a few detonators on separate sheets of lead in the open air. The quality of the detonator is revealed by examination of the sheets.

In the design of cars for use underground in coal mines, it is important to consider carefully the distance apart of their axles. Cars with axles too close to each other, have a tendency to end up and be derailed when there is the slightest opposition to their front wheels. Such an obstacle may be a projecting joint of the rails, or only a small stone or a piece of wood. Even though the car is quickly lifted on the track again, the stoppage of work, when it occurs frequently, is a matter of much consequence. When the axles of the cars are too far apart, the wheels do not easily get off the track, but when this does happen, the cars are difficult and heavy to lift on again.

The depth and direction of shot holes, as also the weight of the charge, are governed by the nature of the material to be dislodged. The position of the bedding and jointing planes, faults, fast and loose ends, etc., is best determined by practical experience. It is important that drills should not be used when they become so worn as to fail of giving easy clearance to the charge. A ridge occurring in a hole may cause the cartridge to stick fast, in which event the operator will often use force to drive it to the end of the hole. In the case of explosives containing nitroglycerin, this action is liable to cause disaster. Even where gunpowder is used, sufficient heat may be developed by friction to produce ignition.

Too much importance should not be attached to the prospective proceedings of Attorney General Wickersham against an alleged combination affecting the production of bituminous coal. It is reported that the suit is to be brought under the Sherman Anti-trust Act. There is no one important bituminous coalfield in America that is controlled by any railroad or single body of men. It is possible that operators in some districts are handicapped by unfair transportation rates, and, if so, the discrimination should be abolished. However, there is no bituminous trust, and no probability of one. It would be about as easy to form a trust in fresh air as in soft coal. When capitalists have tried to buy up the independents in any district, the result has been that the independents have put half the money in the bank and opened new mines in adjacent territory with the remaining money. It would be a costly and endless job to form a bituminous-coal monopoly.

COAL MINE DISASTERS IN GREAT BRITAIN.

Date.	Colliery and County.	No. Killed.
July 15, 1856	Cymmer, Glamorgan.	114
Feb. 19, 1857	Lund Hill, Yorkshire.	189
Dec. 1, 1860	Risca, Monmouth.	142
Dec. 12, 1866	Oaks, Yorkshire.	361
Nov. 8, 1867	Ferndale, Glamorgan.	178
Dec. 6, 1875	Swaithe Main, Yorkshire.	143
Oct. 22, 1877	Blantyre, Lanarkshire.	207
June 7, 1878	Haywood Wood, Lancashire.	189
Sept. 11, 1878	Abercarn, Monmouth.	268
July 15, 1880	Risca, Monmouth.	120
Sept. 8, 1880	Seaham, Durham.	164
Dec. 10, 1880	Naval Steam Colliery, Glamorgan.	101
June 18, 1885	Clifton Hall, Lancashire.	178
Feb. 6, 1890	Llanerch, Monmouth.	176
Aug. 26, 1892	North Navigation, Glamorgan.	112
July 4, 1893	Combs Pit, Yorkshire.	139
June 23, 1894	Albion, Glamorgan.	290
July 11, 1905	National, Glamorgan.	119
Feb. 17, 1909	West Stanley, Durham.	168

**Colorado Coal Mines to Open with Nonunion Labor**

SPECIAL CORRESPONDENCE

The strike of the miners in the northern coalfield of Colorado, by which is meant the lignite fields north of Denver, is still on, with no apparent chance of an immediate settlement. The point at issue is that the miners demand an increase of about 5½ per cent. in wages and an 8-hour day, which must include "bank to bank," instead of the time consumed in going to and from their work (say one hour) being outside of the eight hours. They also demand a half holiday on Saturday, and one or two minor concessions which do not cut much figure in the matter.

The operators stand pat and refuse to grant what the miners ask, on the ground that they cannot afford it. There is no trouble, however, and although the operators have sent some deputy sheriffs to protect their property no threats are made; there are now five months of warm weather ahead of us, when not much coal mining is done; the probability is that the trouble will end in the mines being worked on the "open shop" system, which the operators say they will do. Meantime, it is stated by the operators that they expect to open at least four of the biggest mines in a few days with nonunion men.

would not have occurred if the existing regulations as to watering had been carried out. The whole question, he says, should be considered with a view to incorporating in the special rules, some means of laying dust. "Wet zones" have been proposed and practised, and it is possible that the area of an explosion would be limited in that way.

It may be of interest to recall parenthetically that at Altofts in Yorkshire, experiments are being made in the direction of proving that the admixture of stone dust will be the means of checking flame and limiting the effects of an explosion. W. E. Garforth, well known as the inventor of the "Weg" breathing apparatus, is conducting these tests, and takes a sanguine view of the possible results.

**MINERS MUST COMPLY WITH REGULATIONS**

Having regard to the dangers of coal dust and gas combined, due attention should be paid to regulations suggested by the bitter experiences of the past as

## ? QUESTIONS and ANSWERS ●

Inquiries for information are answered in this department as promptly as possible, but more or less delay is often unavoidable. Many inquiries involve a good deal of investigation and these can be answered only when the general interest in the subject is conceived to justify the expenditure for the time required. Correspondents should refrain from asking for advice that ought to be obtained by professional consultation with an engineer. We will not answer questions pertaining to the value of specific mining enterprises. Inquiries should be framed concisely.

### DAMAGES FROM MINING TRESPASS

A few months ago I read something like the following: A certain mining company had cut into an adjoining property and had taken out considerable ore. This trespass was on an end line. The penalty for such stealing was three times the value of the ore taken out. If any such decision has been handed down, can you inform me where I can secure complete information regarding it?

W. L. W.

We do not recall a case where the penalty for mining trespass involved payment by the defendant of three times the value of the ore taken out; or, indeed, any case involving "exemplary" or "punitive" damages for the extraction of "ore." There are cases in Maryland and Illinois, in which punitive damages (i.e., amounts exceeding the proved value of the property taken) have been recovered for trespass in coal mines. The measure of damages depends upon the law of each State, or, in the absence of a special statute, upon the application of the common law. The general rule is, that for innocent trespass the defendant must pay the value of the ore as it was in the mine, that is, its final market value less the cost of mining, etc. But wilful trespass entitles the complainant to recover the value of the ore without credit for the labor incident to its extraction.

Many incidental difficulties arise in the determination of such damages. For instance, if the exact value of the ore cannot be shown by the defendant, by reason of the destruction or loss of records, or the absence of separate records (the ore unlawfully taken having been mixed with other ore), other evidence as to its value will be accepted and construed with full weight against the defendant. This doctrine was well expressed in 1722, during the reign of George I, by the Court of the King's Bench, in the case of *Armory vs. Delamirie*, in the following words (quoted in *Lindley On Mines*, Sec. 868):

"When the nature of a wrongful act is such that it not only inflicts an injury, but takes away the means of proving the nature and extent of a loss, the law will aid a recovery against the wrongdoer, and supply the deficiency of proof caused by his misconduct by making every reasonable intendment against him and in favor of the party injured. \* \* \* A man who wilfully places the property of others in a situation where it cannot be re-

covered, or its true amount or value ascertained, by mixing it with his own, or in any other manner, will consequently be compelled to bear all the inconvenience of the uncertainty or confusion which he has produced, even to the extent of surrendering the whole, if the parts cannot be discriminated, or responding in damages for the highest value at which the property can reasonably be estimated."

Another question of difficulty is, whether the defendant may be allowed to fix the value of the ore in place by deducting from its gross value the costs of unskilful or wasteful mining and reduction. In some cases, the defendant has offered to prove that the ore taken netted him nothing. But this would be as if a man who had taken another's horse, ridden him lame and then sold him for a song, should propose, as a measure of damages, the price received by him. The usual doctrine seems to be that the complainant shall not be made to pay for the defendant's ignorance and blunders.

In estimating the cost of mining, transportation or reduction which may be allowed to an innocent trespasser, it is not usual, we think, to include general expenses, dead work, new constructions, etc. Thus, if, during the period of trespass, the defendant mined 10,000 tons of ore of which 1000 tons belonged to his neighbor, he cannot deduct from the gross value of that 1000 tons one-tenth of his total mining expenses. The actual cost of stoping, tramming and hoisting—not the running of new levels, sinking of shafts or timbering outside of the stopes—may be thus deducted.

It will easily be seen that when the defendant, a wilful trespasser, produces no proof of the returns received from the ore taken, but evidence is given as to the usual *net* value of the ore from that deposit, the damages (which in that case would be the *gross* value) might be assessed at three times the *net* value. Thus, if the trespasser netted from his operations \$2 per ton of ore mined, it might be assumed, for lack of a better measure, that the *gross* yield was \$6 per ton; and in this way "three times the value of the ore" might happen to be recovered. Interest is, we believe, always collectible from the date of the trespass. The foregoing are the leading principles; but the books are full of special applications.

### MANUFACTURE OF PAVING BLOCKS FROM PEAT

Can you give me some information regarding the use of peat for paving blocks—where has it been used; who manufactures the necessary machinery for its preparation; could peat occurring in salt water be used? G. D.

Friedrich Schünemann, of St. Louis, Mo., has described<sup>1</sup> the process covered

<sup>1</sup>"Artificial Wood Made from Peat." *Journ. American Peat Society*, April-July, 1909, Toledo, Ohio.

by the Helbing patent (German No. 128,728) for making boards, paving blocks, and similar materials from peat. The process is in substance as follows: Fibrous wet peat is washed, without grinding, mixed with lime and an aluminum salt, and possibly "sulphurous argillaceous earth," and the mixture is pressed in molds, in hydraulic presses, under pressure of 6400 to 7100 lb. per square foot. After a short application of pressure the board or block can be taken out of the press and dried in the open air, and when dry can be worked into any desired shape or size as easily as wood.

A copy of official tests made by the royal mechanical-technical experiment station of the Technical Academy at Dresden, shows the "peat wood" to exceed natural wood in compression strength and wear and tear; that it is less absorbent and inflammable, only glowing when held in a hot flame. Its tensile strength exceeds that of the softer woods. The only plant reported is that of the inventor, situated at Wandsbeck, near Hamburg, Germany. It is doubtful if peat occurring in sea water could be used for this purpose by the process mentioned, as it is probable that the dissolved salts in the contained sea water would react unfavorably on those used for cementing material. This is, however, merely a surmise.

More information could probably be obtained on the whole subject from Mr. Jablonski, general secretary of the "Verein zur Förderung der Moor-Kultur in Deutschen Reiche," with headquarters in Berlin. While the product is an excellent and desirable one, it has never attracted capital enough to have its possibilities thoroughly tested. Mr. Schünemann owns the American rights to the Helbing patents and is desirous of interesting capital in the process.

### VALUE OF TALC DEPOSITS

What are the commercial possibilities of a talc deposit situated within about 100 miles of New York?

W. V. C.

The value of a talc deposit within reasonable distance of New York might vary widely, depending primarily upon the grade of talc and its proximity to transportation. The market for talc products is limited, especially for the ordinary grades of ground talc. The fibrous talc found near Gouverneur, N. Y., is used chiefly in paper making and is worth about \$10 per ton at the mill. The massive variety when quarried and manufactured into soapstone products such as slabs, plumbing fixtures, gas tips, etc., brings varying prices, from \$12 per ton upward. The ordinary ground talc is worth from \$6 to \$20 per ton, while the French and Italian talcs bring from \$13 to \$40 per ton. These prices are for ground or manufactured product.



## PERSONAL

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

J. Parke Channing has returned to New York from Arizona.

Dr. James Douglas has returned to New York from Arizona.

Charles F. Saviers, of Mapimi, Durango, Mexico, is in Philadelphia.

Pope Yeatman has gone to Utah and Nevada, to be absent about three weeks.

H. V. Winchell, who has been spending some time in New York, has gone to California.

A. J. McMillan, managing director of Le Roi mine, Rosslund, B. C., is on his way to New York.

E. P. Merrill, of Cleveland, Ohio, is in New York, and leaves this week to examine coal mines in Kentucky.

Robert H. Richards has just returned to Boston from a professional trip to Virginia and to New York City.

J. E. Spurr, of Spurr & Cox, Inc., has been appointed consulting geological engineer to Camp Bird, Ltd., at Ouray, Colorado.

George A. Tweedy, manager of the Minas del Tajo, Rosario, Sinaloa, Mexico, is in New York on his way to Europe on business.

Dr. G. E. Cram, for seven years past prominent in the Mapimi district, Durango, Mexico, is in New York on mining business.

Walter Harvey Weed is making a geological examination of the mines of the Wolverine & Arizona Company, near Bisbee, Arizona.

Linn W. Searles, of Bristol, Tenn., is at Gadsden, Ala., on professional business for the Alabama Consolidated Coal and Iron Company.

Dwight E. Woodbridge, of Duluth, Minn., was in New York last week, but sailed April 23, having gone abroad on professional business.

W. G. Trethewey has assumed control of the Dominion Cobalt Mining and Development Company, which has a location adjoining the North Cobalt.

Douglas F. Reed, E. F. Ayrault and Count Alfred du Puy Fontaine, all of Paris, have been visiting the United Verde and other mines in Arizona.

A. M. Yonge has resigned his position as general superintendent of the Aguacate Mines Company, of Costa Rica, and has returned to Richmond, Virginia.

John D. Pope, who has been foreman of North Butte since its organization, has been appointed manager to succeed A. C. Carson, who resigned four months ago.

Dr. Arthur A. Hamerschlag, director of the Carnegie Technical schools of Pitts-

burg, delivered the class address to the class of 1910 of the Michigan College of Mines.

Herbert Haas has removed his office from 61 Fremont street to 528 Merchants' Exchange, San Francisco. Mr. Haas is at present in Arizona on professional business.

George W. McDaniels, engineer for Spurr & Cox, of New York, is examining the Diamond Joe mine in the Bill Williams district, the copper end of Mohave county, Arizona.

Benjamin Talbot, managing director of the Cargo Fleet Iron and Steel Company, Middlesborough, England, is visiting the United States in the interest of the Talbot continuous steel process.

R. H. Burrows, of Guanajuato, has accepted the position of manager for the mining subsidiary to the Kansas City, Mexico & Orient Railway Company, with headquarters at Chihuahua, Mexico.

J. B. Fleming has gone to Goldfield, Nev., to take charge of rebuilding that portion of the Goldfield Consolidated mill which was recently destroyed by fire. Mr. Fleming had charge of the original construction of the mill.

Marion Beckwith, recently superintendent of the Quartz Hill mine at Old Diggings, Shasta county, Cal., has been appointed superintendent of the mines owned by the United States Smelting, Refining and Mining Company, at Pachuca, Mexico.

## OBITUARY

Mott I. Newhouse died suddenly April 22 in Paris, France. He was a brother of Samuel Newhouse, and was associated with him in many of his mining operations. He was 51 years old.

William Strickland committed suicide at Wickenburg, Ariz., April 16. He was 70 years old, and a graduate of Heidelberg University, and is said to have been employed as a teacher and lecturer in several colleges. He had been a resident of Arizona for five years, being employed as an assayer.

John McCallen died at Irwin, Penn., April 13, aged 71 years. He was born in Ireland and came to this country when a young man, settling at Irwin 48 years ago. He started with the Westmoreland Coal Company as a checker, when it was first organized and had been with the company ever since, gradually rising to a responsible position.

John Von Bergen died suddenly at Scranton, Penn., April 14. He had been for many years engaged in mining in the anthracite country and was considered an authority on mining questions. He had been for a number of years manager of the Scranton Coal Company, and all the coal interests of the New York, Ontario & Western Railroad Company.

## SOCIETIES and TECHNICAL SCHOOLS

*Iron and Steel Institute of Great Britain*—The annual meeting will be held May 4 and 5, in London.

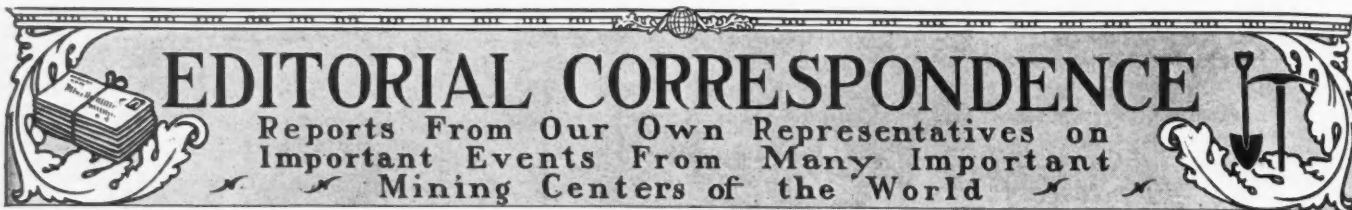
*Rocky Mountain Club of New York*—The club holds a meeting and smoker April 30 at the Waldorf-Astoria, New York.

*American Chemical Society*—At the meeting of the Pittsburg section on April 21, a paper was read by Earl Blough on "Aluminum in Industrial Engineering." Dr. W. O. Snelling, chief of the explosives laboratory, United States Geological Survey, spoke on "Thermo Chemistry of Explosives."

*University of Wisconsin*—The mining engineering building at Madison is now nearing completion. Much of the equipment of mining machinery has already arrived and the laboratories will soon be in readiness for research and instruction. The basement portion is to contain the crushing and screening room, the ore bins, supply room, dark room, and ash wells. The upper floor is divided into a large assay furnace room, a chemical laboratory, a balance room, two offices and the gallery on which will be installed the hand ore-dressing equipment and the mining museum.

*Utah Society of Engineers*—The fourth annual meeting and dinner were held at the Commercial club, Salt Lake City, April 15. About 35 members were present. Officers for the coming year were elected as follows: O. A. Honnold, president; C. H. Repath, first vice-president; F. E. Arnold, second vice-president; W. C. Ebaugh, secretary; B. F. Tibby, treasurer. R. E. Caldwell acted as toastmaster, being introduced by President J. F. Merrill. The toasts were as follows: "Salient Points in Smelter Building," C. H. Repath; "Hydro-Electric Development," Leonard Wilson; "Irrigation in Idaho," Alexander McPherson; "Power Plants in Utah," Owen H. Gray.

*Association of American Steel Manufacturers*—At the recent annual meeting steps were taken to add to the manufacturers' standard specifications one governing the chemical and physical properties of concrete reinforcement bars. This new specification will be published by the association upon formal adoption by letter-ballot. Another subject referred to ballot by the meeting, is a schedule of standard allowable variations in the size of hot rolled bars and in the weight of angles and other shapes of bar size. All officers were re-elected, as follows: President, W. A. Bostwick, Carnegie Steel Company; vice-president, A. A. Stevenson, Standard Steel Works Company, Philadelphia; secretary and treasurer, Jesse J. Sherman, Jones & Laughlin Steel Company, Pittsburg.



## EDITORIAL CORRESPONDENCE

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

### San Francisco

April 25—Under the California corporation laws, foreign companies doing business in the State must pay the same license taxes as companies organized under the laws of California. The Refining and Producing Oil Company, capitalized at \$21,500,000, and the Petroleum Producing Company, capitalized at \$10,000,000, organized under the laws of Nevada, on filing papers with the Secretary of State are said to have been presented with a bill of \$3250 for license taxes, etc. These oil companies have brought action in the State supreme court to invalidate the California law, basing the action on a decision of the U. S. Supreme Court, which declared a similar law in Kansas to be invalid.

The lower Klamath river in northern Humboldt county may be the scene of dredging operations during the coming season. Thirty-five placer claims have been located. Attorney Henry L. Ford, of San Francisco, is interested.

The Northern California Mining Company has filed a formal abandonment of 6400 acres of land in Butte county. Most of the locations of this company, originally covering over 200,000 acres of land, were selected where fine timber covered the surface and much of the so called annual work consisted in the building of trails and telephone lines until an investigation was started by the Department of the Interior, which resulted in the canceling of a large number of entries in Plumas county. Since that date more or less testing of other claims has been made by the company and it has been found that much of the land is not valuable for mining purposes, and hence, has been abandoned.

M. Mayekama, a Japanese mining engineer, has been inspecting dredging operations and dredging lands at Oroville. He declares that there are lands in Korea even better suited to dredging than those at Oroville, and expects to install a dredge on the lands owned by his company in Korea. The mining taxes there are light, being 1 per cent. of the gross output, with a ground tax of 50c. per acre.

The belt of gold mines in Sierra county extending from the Standard mine north of Downieville, south through Alleghany to Moore Flat in northern Nevada county, continues to show up surprises. Nearly all of the mines of the belt are characterized by rich free-gold ore, usually accompanied by arsenical sulphides of high content. The recent strikes embrace

the Standard, the Rainbow, Sierra Wonder and Eastern Cross, at Alleghany, and the Middle Yuba and Fruitvale at Moore Flat, on the south side of the Middle Yuba river in Nevada county was for many years the scene of successful hydraulic mining operations. The great amphibolite-serpentine belt, in which the Alleghany mines occur, crosses here into Nevada county. The ore recently uncovered at Moore Flat is said to rival that of the Alleghany mines in richness.

The miners of the Queen Radigunde mine at Alleghany have requested a raise of pay from \$3 to \$3.50 per day and have given May 1 as a date on which a reply is demanded. It is understood that similar demands will be made on the other companies operating in the district.

As a result of a meeting at Bakersfield on April 15, the Coalinga Oil Producers agency was merged into the Bakersfield agency and the contracts of the Coalinga agency with the Producers Transportation Company and with the Union Oil Company were ratified. The Bakersfield agency is now the largest producing body in the State. The Union Oil Company will market the product.

The San Joaquin Light and Power Company is about to expend \$1,250,000 on a power plant on the north fork of the San Joaquin river, near Fresno, where there is already a small plant. The larger plant will develop 22,000 h.p., and supply several towns as well as the Coalinga oilfields. A dam 125 ft. high will be built.

The projected California-Arizona oil-pipe line will start from the end of the line of the Producers Transportation Company at Midway in Kern county, and approach the Santa Fe railway at Mojave. From there it will follow the railway by the Parker cutoff to the branch railroad to Phoenix, Ariz., and thence on to Phoenix.

The Lakeview gusher north of Maricopa, has now been spouting oil for over five weeks and shows no diminution. It is reported to have produced over 700,000 bbl. of oil in this time. The Union Oil Company is the heaviest stockholder. This well is said to be the greatest gusher in the history of the oil industry in America.

### Denver

April 23—Now the camp of Aspen is wrestling with the cooperative drainage question, and a movement is under way to get the mine owners to agree to a division of pumping costs in unwatering the

properties at great depth. It is said that there is no good reason for their not doing so, as the camp is now supplied with cheap hydroelectric power.

The Trilby mine of the Moose company, on the western slope of Bull hill, Cripple Creek, is being worked by lessees and also on company account, and is a steady producer. It has now joined the group of those mines of the district which are finding rich ore in the deepest levels, which fact, owing to the approaching completion of the deep drainage tunnel, is eminently satisfactory. A good strike of two feet of ore is reported on the 1300 level. Lessees Hogan and Wright are said to be mining 2-oz. gold ore from below the 500 level, and it is stated locally that there are six orebodies exposed in the mine from which ore is being shipped of from \$7 to \$60 in value. The average of all the ore from the whole mine is probably 1½ oz. per ton. The country rock below the 400 level is breccia, and some of the ore (telluride) is in a basalt dike, and some in a zone of shattered phonolite.

### Goldfield

April 22—The performance of the Goldfield Consolidated Mines Company in resuming operations in its big mill in seven days and nine hours from the time the serious fire of April 8 broke out, demonstrates resourceful management. The fire, starting in the refinery, thoroughly wrecked that department, and then almost entirely destroyed the storehouse and contents, the change-rooms and the 700-ft. belt conveyer which carries ore from the coarse-crushing building to the battery storage bins at the top of the mill. Twenty stamps were completely disabled, but the fire was checked before the other 80 stamps or any of the other machinery in the mill proper became damaged. The actual property loss was estimated at about \$200,000, a comparatively small amount, but the chief concern of General Manager Finlay and Director McKenzie, who arrived in Goldfield the day after the fire, was to get the plant in shape to operate the 80 uninjured stamps in the shortest possible time. The supplies in the storehouse were to a large extent perishable, and it was necessary to replace many of these before a great deal could be done. Orders were sent out by wire for much of this material even before the fire was over, and new supplies were soon coming in from all parts of the country. The precipitating department in the refinery was out of commission, so

none of the solution from the lower part of the mill could be handled. This held up the rest of the mill and made it impossible to crush even the 2000 tons already in the battery bins. A large force of men was put to work in the refinery clearing away the wreckage and cleaning up precipitate which was scattered all over the place. The fire occurred in the middle of a "melt" so that considerable fluxed precipitate as well as the contents of two large acid-treatment tanks was spilled everywhere. It was found that the Merrill precipitating and filtering presses were unimpaired. After being cleaned and supplied with new filtering cloths, they were in good shape. It was decided, pending the construction of a new refinery to replace the acid treatment with a niter roast. Since the roasters and three of the four melting furnaces were in condition to be repaired the refinery was inclosed with sheet iron and was in fair condition for temporary work. The greatest problem was to devise a method for getting the ore from the coarse gyratory crushers under the railroad bins up to the battery-supply bins. The big 700-ft. rubber belt of the inclined conveyer was entirely destroyed and even if the trestle could have been replaced it would have required 60 days to have the belt made to order and shipped to Goldfield. It was finally decided to build a temporary inclined, double track tramway from the bottom of the hill to a point behind the mill on a level with the top of the storage bin. Mine cars and track were used and an electric hoist installed to pull the cars up. A temporary track was built over the orebin and the cars were trammed in by hand. The ore from the crushers was relayed to a loading bin at the lower end of the tramway by means of a short belt conveyer running on the regular conveyer idlers. A portion of the distributing conveyer belt which had run above the uninjured 80 stamps was utilized for this purpose. In one week all of this work was completed and the mill was pounding ore at practically 80 per cent. of its normal capacity. Meantime work was being rushed clearing away the bent and twisted steel around the injured stamps so that as rapidly as possible new batteries could be installed and new steel work set in place for the reconstruction of the mill building. The present conveying system will in no way interfere with the rebuilding of the old conveyer so that within 60 days it is hoped to have the entire plant in just as good or better shape than ever.

The fire affords room for some speculation on fireproof mill construction. The Consolidated mill was a structural steel building and was regarded as fireproof. Working on this basis the company provided practically no fire protection whatever. At the time of the fire the nearest available fire-plug was 100 yards away, the fire hose was practically all stored

away in the burning storehouse and when connections were finally made it was impossible to get any thing like an adequate pressure. The Consolidated management is planning to install ample fire protection and it looks as though the conclusion has been reached that the mill is far from fireproof.

Another step in this direction will be the building of a new refinery farther up the hill and several hundred feet from the rest of the mill. The present location is a poor one. It stands between the mill proper and the storehouse with the long inclined conveyer running above both it and the storehouse. The wooden conveyer trestle and rubber belt being directly over the refinery immediately took fire and the blaze spread with practically no hindrance in each direction taking in both the storehouse and the adjacent end of the battery building. The new refinery will be larger and probably of different design.

The mines were shut down for a few days but most of the men were put to work around the mill.

George Wingfield, of the Goldfield Consolidated, has made the final payment on the Buckhorn property in Eureka county, a new camp of apparently remarkable possibilities. Mr. Wingfield has had an option on the property from Jones & Rannells for the past year, and during that time has had a force of men doing extensive development work on the ground. It is a milling operation, although some high-grade ore has been found.

#### Butte

April 23—The Georgetown district, Granite county, is the scene of considerable activity. The investigation of the title and deposit of the Southern Cross mine is under way and the deal will probably be consummated. Gordon & Zink are working the Red Lion property and mill. William McIntyre, operating the American Flag under bond, will begin shipping as soon as the roads are opened. The Modoc mine has been worked steadily all winter under bond to the Modoc Mining Company. The shaft is down 100 ft., from which depth a crosscut has been run to the vein, proved to be 30 ft. in width. The management states that assays give \$6 per ton in gold and 4 per cent. copper. At the Montana mine, leased by Hugh McFadden and others from John Ducie, a hoist for 500 ft. and a No. 7 Knowles pump are being installed. It is the intention of the lessees to sink the shaft, now 110 ft., to 500 ft., and from there crosscut.

In the Corbin-Wickes district, W. Q. Ranft, of Missoula, has acquired the Blue Bird mine, and will operate it jointly with the Robert Emmet, also controlled by him and which has recently been supplied with electric power. The Hageman

group, near the Blue Bird and owned by Larson & Donaldson, of Helena, has recently disclosed some good copper ore.

At the annual meeting of stockholders of the North Butte company, held in Duluth, April 18, the old board of directors was reelected. The report to the stockholders on the financial condition of the company Dec. 31, 1909, shows that at that time there was \$62,466 cash in the treasury. The mining property is valued at \$7,221,181, the furniture and fixtures at \$1717; accounts receivable, \$325,482. The cost of producing copper is stated to be 10½c. per lb. The ore reserves are given out as follows: Edith May, 627,671 tons; Jessie, 173,237; Adirondack, 9090; Gem, 2373; Speculator, 4000 tons.

Dr. R. J. Formad has recently made a report to the bureau of animal industry of the Department of Agriculture concerning the effect of the Washoe fumes upon the livestock and vegetation in the Deer Lodge valley. The report states that from 1902 to 1906, 2024 horses died in the valley as a result of these fumes. An analysis of the grass and hay in the valley is said to show the presence of a considerable quantity of arsenic.

#### Salt Lake City

April 24—A bulletin by the United States Weather Bureau of Salt Lake City on April 15 states that there is less snow than usual in the mountains. A good water supply is assured, however, as most of the snow is well packed, some of it being in the form of ice, which condition is favorable to late melting. In Salt Lake county, Little Cottonwood Cañon, the snow averaged about seven feet in depth, while the amount of snow and ice in Big Cottonwood was not over one-half of what it was last year. In both cañons the snow was well packed. There was less snow in Beaver county than in former years, but it was unusually solid, and the normal supply of water is expected.

The Tintic Mining and Development Company owns the Yampa mine at Bingham, and has property in the Tintic district. The Yampa smeltery near Bingham is operated by the Yampa Smelting Company, which is controlled through stock ownership by the Tintic Mining and Development Company. At the present time the Yampa smeltery is handling between 600 and 700 tons of crude ore daily. The ore is a heavy sulphide, and comes almost entirely from the Yampa mine, which is connected with the smeltery by an aerial tramway 12,300 ft. long. The average copper content is in the neighborhood of 1.7 per cent. with a small silver and gold content. Some custom ore is received from leasers and others, but this is variable in amount and is not being actively solicited. On account of the large excess of iron in the Yampa ore, the company is able to treat some silicious

ore from certain parts of Bingham. Two reverberatories and one blast furnace are being operated out of a total of three blast furnaces and three reverberatories. The ore is calcined in McDougall calciners. The company erected a two-stand converter plant in 1907, and reduced matte of 20 to 40 per cent. copper content to blister copper, which was shipped to Chrome, N. J. for refining. This plant was operated about a year, but is not being used at present. It is said that the output of matte was not large enough in connection with such ores as the company was receiving to operate the converters at a profit. At the present time the company has a contract with the American Smelting and Refining Company, and ships its matte to Garfield.

The holdings of the Tintic Mining and Development Company in Tintic include claims between the Sioux and Carisa on the east and the Mammoth and Gold Chain on the west. The company ran the old Sioux-Ajax tunnel, and spent considerable money in development work but without important results. The claims are not being actively worked at the present time. Whether the company is operating at a profit or not is known only to inside interests, as it is operated as a close corporation and makes no public reports. It is generally understood that for some time it has not much more than paid expenses or has been operating at a loss, but has recently been doing somewhat better. No dividends have ever been declared.

The Salt Lake Stock and Mining Exchange has taken steps to revise some of the present business methods which have resulted from a lax enforcement of the rules. At a meeting of the membership committee of the board of governors, April 1, it was decided that every member should be called on to render a statement of his financial condition at not infrequent intervals. There have been three failures which would have been avoidable under a strict observance of the rules of the exchange, especially those regarding future trading. The rules provide that when a "buyer" or "seller" transaction is made the stock and 30 per cent. of its value must be deposited. This has not been enforced, and many of the future deals have had only a personal agreement to bind them. A new rule was adopted by the governing committee which requires that after April 15, 1910, contracts covering future options shall be deposited with the secretary of the exchange, with either the stock or certified check attached.

#### Seattle, Wash.

April 24—A cablegram signed by eight of the leading bankers and business men of Fairbanks, Alaska, urges the immediate sending of 1500 men as there has

been a stampede to Haiditarod (Iditarod) and there is serious danger that placer-mining operations in the Tanana valley will be hampered during the coming season in consequence. The spring clean-up at Fairbanks and vicinity is estimated at \$9,000,000. On account of the discovery of rich gold ore in the "George E." mine at Stewart, on the Portland canal, there has been a rush of prospectors from Ketchikan and Juneau.

#### Deadwood, S. D.

April 24—The Homestake mines and mills are now running again at full capacity. Public sympathy is with the company. Although technically the strike is not yet over, practically most of the men have returned to work, and it is generally believed that the end of the trouble is in sight. In the future, the Homestake will probably be strictly non-union.

#### Cobalt

April 25—The Dominion Reduction Company has been organized by Pittsburgh interests to erect a custom plant at Cobalt for the treating of low-grade ore. At the present time there are two custom mills, the Nipissing Reduction, and the Northern Customs. The former is handling nothing but the output of the Kendall shaft of the Nipissing while the latter is treating ore from the City of Cobalt, the La Rose and the Nancy Helen. Both of these mills have more ore than they are able to handle.

It is reported that D. Lorne McGibbon, president of the La Rose, is to be appointed a director of the Nipissing at the next annual meeting to be held shortly. If such is the case, this will be a big step toward the merger of the two properties. Mr. McGibbon has frankly stated that he is favorable to such a plan.

A smeltery to treat Cobalt high-grade ores is to be erected at Swansea, near Toronto. There are three Canadian smeltries that are treating approximately 75 per cent. of the high-grade output of this camp.

#### Toronto

April 25—As a result of the unexpectedly early spring and the breaking up of the winter roads, the Porcupine mining camp has been practically cut off from communication with the outside world, greatly interfering with development. To prevent the forfeiture of claims, the Department of Mines has extended the time for the first 30 days' work on claims staked between Jan. 1 and March 15 until June 15.

A mining suit, involving an important legal point as to the rights of companies incorporated outside of Canada, was de-

cided here March 19 by Chief Justice Falconbridge. An action was brought against Henry Timmins by Grant Hugh Browne, of New York, on behalf of the United Cobalt Exploration Company, a New Jersey company, for the recovery of \$150,000 deposit money on two claims at Cobalt, bought for \$750,000. The company, to which Browne had transferred his interests, was made a party to the suit. The judge dismissed the case on the ground that a foreign corporation not licensed in Ontario had no status and could not bring suit.

E. E. Jones and A. Blackburn, the two prospectors charged with causing the recent rush to the Camel's Back Lake area when about a thousand gold-seekers were deceived by erroneous reports, have been arrested and brought to Haileybury to face charges of perjury and obtaining money under false pretences. They are alleged to have sold claims to Haileybury men for \$2000, signing affidavits as to their value. They assert their innocence of intentional wrong doing and it is claimed surrendered themselves of their own accord. They are prospectors who had been in the Porcupine district all winter.

John Morton recently located an iron property in the immediate neighborhood of Fort William, Ont. He forwarded samples to the Geological Survey at Ottawa and has received a report from Director Brock stating that it carries large quantities of magnetite and is good commercial if the deposits are of sufficient quantity. Development work is being undertaken.

#### Monterey, Mexico

April 22—There is a movement on foot to carry natural gas into Houston and Galveston, Texas, from the Caddo field in Louisiana. The same interests which are reported to have the capital needed are in control of the Agualares gasfield near Laredo, Texas. This field and Caddo both have wells producing 20,000,000 to 30,000,000 ft. of gas per day, and extend over a large area and give evidence of long production. These same interests are planning the erection of zinc smeltries to use this gas on both sides of the Rio Grande, near Laredo.

The Compañia Agricola y de Fuerza Electrica del Rio Conchos, a Pearson concern, has completed the grading for its 39-km. railroad from Santa Rosalia to the dam on the Conchos river in Chihuahua, and it is anticipated that tracks will be laid the entire distance within 30 days, and that trains will be running by June 1. The same progress is being made with the dam itself. This is an important undertaking for the mining as well as other interests throughout northern Mexico, as it means cheaper power.



# THE MINING NEWS

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

## General Mining News

Relative to the copper merger matter, Thompson, Towle & Co. say: "We understand that conferences have been held since the Washington situation has cleared, which it is believed means a resumption of negotiations looking toward a merger of properties which will control an annual copper production of between 900,000,000 and 1,000,000,000 lb. Such a merger cannot be brought about easily because of the wide difference of opinion between the Cole-Ryan and Guggenheim interests as to property values, but the fact remains that negotiations have been resumed, if only in a tentative way. The culmination of the merger plans, however, may be many months off, for the prime movers are not prepared to formulate their plans too definitely until the legal aspects become clearer."

### Alaska

James and Charles Meaghan and W. J. Somerville will install machinery on their mining property at Bluff City, Nome district.

At Willow Creek the stamps for the Brooklyn Development Company are being installed. Three mills will be in operation in this district this season.

The Johnson-Gorley-Barry claims on McLean's Arm, Juneau district, have been sold to Eastern capitalists, and development work will be rushed. The ore carries copper and gold.

*Lon de Van*—This company on George's inlet will install a power plant. Otto Lonstorf is manager.

*Marble Bay*—This group on Dall island has been bonded to the Pacific Metals Mining Company, of Victoria, which will begin work at once.

*Alaska United*—The report for the month ended March 15 is as follows: Total crushing, both mills, 17,440 tons; total production, \$64,285; net, \$23,687; yield, \$2.25 and \$2.35 per ton milled.

### Arizona

#### COCHISE COUNTY

*California & Paradise*—This company at Paradise has installed an engine and pumping and hoisting equipment and expects to start shipping. W. V. Richards is superintendent.

*Calumet & Arizona*—The drift on the 550 level of the Irish Mag has broken into the cave. Just before entering it passed through 30 ft. of the highest grade fibrous malachite. At the Oliver shaft

the sulphide orebody on the 1350 level has now been blocked out.

*Superior & Pittsburg*—The Briggs shaft continues in sulphide ore. As the shaft gets deeper a higher grade ore is being found. The recovery has increased per ton from 73 lb. in 1907 to 87 lb. in 1908 and 95 lb. in 1909. The cost for 1909 was 9½c. per pound.

*Wolverine & Arizona*—Stoping continues in the orebody next to the Copper Queen and Shattuck side lines.

*Denn-Arizona*—At the Denn drifting and crosscutting is continued on three levels. For the last three months the pumps have handled about 700 gallons of water per minute.

#### GILA COUNTY

*Miami*—J. Parke Channing, during his recent visit in Globe, said that everything in connection with the building of the new concentrator is proceeding according to schedule and that he expects to have the mill running toward the end of 1910. Regarding the results of the churn drilling on the northwest part of the property, Mr. Channing said that while the developments had been most satisfactory, he disliked to predicate reserves on data of this character. He said, however, that seven holes drilled to date at 200-ft. intervals have struck ore varying in thickness from 110 to 210 ft., and of grade ranging from 2 to 2.5 per cent. copper. The total area prospected by the drills is about four acres, indicating 2,000,000 tons of ore. The drilling will be continued until the entire property is gone over.

*New Keystone*—J. Parke Channing recently stated at Globe that the orebody at the New Keystone is more or less undulating following the topography of the schist underlying the porphyry and that while the results of drifting, crosscutting and churn drilling so far have been satisfactory, all the work has not been sufficiently correlated to enable him to make estimates of tonnage. He thought, however, that in about two months the various connections will be made so as to give definite figures. Mr. Channing said that undoubtedly a large body of ore running over 2 per cent. copper will be developed and that the ore can be mined cheaply by means of adits, as it is well up above the level of the gulches. On the Philadelphia group three holes recently drilled have given negative results in two cases, while the third is not yet deep enough to give definite results.

#### MOHAVE COUNTY

*Tom Reed*—Ten of the 30 stamps in the new mill are in commission producing \$40,000 monthly. All development and equipment and several dividends have been paid out of the mine during the last two years. S. S. Jones is superintendent.

#### PINAL COUNTY

*Cobabi*—This company, 75 miles west of Tucson, is completing its 100-ton concentrating plant and will build a smeltery. S. G. McWade, manager.

#### YUMA COUNTY

Machinery for a \$30,000 placer plant to be erected in the Quartzite district has arrived at Vicksburg. The company will install a pumping plant 5 miles away.

### California

#### BUTTE COUNTY

The Streeter ranch is being prospected for dredging purposes.

*Bonanza*—This company has been incorporated at Oroville to operate the Merrimac mine on the Western Pacific.

*Standard*—This mine near Oregon City may shortly be reopened.

*Bumble Bee*—The Chilean mill at this mine in Morris ravine is crushing ore with satisfactory results. The incline shaft is down 240 ft. and will be sunk deeper.

*Banner*—The Banner quartz mine, on the south slope of Table mountain is being put in shape for operations. W. E. Livesley is in charge.

*Old Glory*—Mr. Phillips is again operating this gravel mine, Morris ravine. Machinery was installed here two years ago.

*William Beik*—In this mine, east of Forbestown, a 4-ft. vein of ore has been encountered. The mine is equipped with a 5-stamp mill.

*Gold Bank*—This mine is under bond to Donald Woodrum.

#### NEVADA COUNTY

*Marcotte*—A merger is planned of the Marcotte, Starr, Ethel and Baltic groups near Washington, as all of this ground can be worked through the lower Marcotte tunnel. All of these mines have been productive.

*Birchville*—Superintendent Fred Medlin has gone to this mine, Graniteville district, to make preparations for resumption.

*Canada Hill*—Satisfactory progress is being made in unwatering and stoping is

in progress in the upper levels. The ore is treated at the *Mayflower* mill. B. Barnes is superintendent.

*North Star*—The company has purchased the Tulle Belle claim and the mineral rights to 105 acres of the Nancy Collins estate.

*Ocean Star*—The Red Cross mill is being transported to the Ocean Star at Omega.

*Middle Yuba*—Much interest is shown in the specimen ore exhibited in Nevada City from this mine at Moore Flat. E. A. Bauder is the owner.

*Blue Lead*—Superintendent Oscar Jones, of the drift mine at Relief hill, reports that the channel has been intersected.

*Prudential*—Development is actively in progress on this property, formerly known as the New York-Grass Valley Consolidated. Superintendent Wilson is drifting on the 900- and 1000-ft. levels.

*Gold Blossom*—The tunnel is in 800 ft., and the vein is exposed for this entire distance.

## Colorado

### CHAFFEE COUNTY

*Madonna*—A new bonanza has been discovered in this mine, which promises to rejuvenate the property to the eminence that it possessed during the '80s.

### LAKE COUNTY—LEADVILLE

*Louisville*—This mine on Carbonate hill, operated by Hanifer and associates, is producing about 50 tons per day of ore of good grade.

*Valley*—This property, in South Evans gulch, has been shipping regularly, and is doing extensive underground development.

*Anona*—This mine in Iowa gulch, which has been idle for a year, is to be started up under the management of Howard B. Collins.

*Alps-Aztec*—This tunnel, at the head of Little South Evans gulch, which has been worked steadily for a year past, is in 583 ft., and is following a small streak of gold ore, expecting to reach the main orebody shortly.

*Printer Boy*—This mine, under lease to Andrew Hill, is producing two carloads a week of high-grade ore.

### PARK COUNTY

*Hilltop*—This property, in the Horse-shoe district, has started shipping from Leavick. Several hundred tons per day are being produced, and the bucket tram from the mine to the railroad is in operation. The ores are a silver-lead and a zinc. H. F. Berger is the lessee.

### SAN JUAN DISTRICT

*Gold Bug*—In this group, in the tellurium belt, in the southeastern section of San Juan county, Tully & Vota, lessees,

report a strike of 4 ft. of ore. Some four inches of this carries from 10 to 70 oz. gold, and 20 to 150 oz. silver. The balance of the vein averages about \$20 in value. The extent of the orebody has not yet been shown by development.

*Shenandoah*—In this mine, a winze being sunk from one of the levels, has opened up a large body of gray copper ore, carrying high gold and silver.

### TELLER COUNTY—CRIPPLE CREEK

*Princess Alice*—The Ruby mine, Bull hill, is said to have opened permanent shoots of high-grade ore at the 1500 level. It is under lease to one of the Humphreys-Thompson syndicates.

*Gold Dollar*—H. Martin and others, leasing on this mine on Beacon hill, are reported to have made a strike of 4 ft. of sylvanite ore, which is estimated to average 2 ounces.

*Vindicator*—This mine, April 20, sent out three carloads averaging 1½ oz. gold to the ton. The company will pay a quarterly dividend of 3c. per share April 25. The amount is \$45,000, which will make a total paid of \$2,137,500.

*Savage*—The International Gold King of this company, on Gold hill, has been leased by W. W. Kirk, of Colorado Springs, and a force put to work.

*Portland*—This company paid a dividend of \$60,000 on April 15, making the total to date \$8,557,000.

*Pinnacle Leasing*—The Mitchell mine at the base of Bull hill, near Cameron, is reported to have a strike of from 3 to 6 ft. of ore at the 350 level, grab samples of which run from 2 to 5 oz. gold per ton. The vein is in breccia, and most of the ore is found between two basalt dikes and sometimes in the dike.

*W. P. H.*—Four cars of ore per week are being shipped from this mine on Iron-clad hill, by Fogleman & Roche, lessees.

*Granite*—The Monument mine of this company, under lease to the Carol company, is outputting from every level from the 1100 to the surface, and last month produced 750 tons of average content of \$30 per ton. The deep levels are operated through the Gold Coin shaft, and produce the best ore.

*Uintah-Ajax*—The Necessity, on Battle mountain, owned by this company, and operated by the Uintah Leasing Company, in March produced 150 tons of very high-grade ore, and the stockholders of the latter company received a dividend before being called on for the first monthly assessment.

## Idaho

### CŒUR D'ALENE DISTRICT

*Federal Mining and Smelting Company*—The stockholders have ratified the compromise with Bunker Hill & Sullivan, whereby 27,000 shares of the latter are turned over for the Last Chance mine. It is estimated that these shares will

yield the Federal \$108,000 per annum in dividends. The Federal company used to be controlled by the Guggenheims, but now is understood to be in the hands of John D. Rockefeller.

*Mineral Point*—In consideration of the control, eastern stockholders have decided to run a 1500-ft. crosscut tunnel.

*Hecla*—Nearly all ore is being broken from the stope above the 900-ft. level. On the 1200, the drift has followed the fracture zone about 400 ft. easterly. It is figured that it must be driven as far again before the oreshoot will be encountered. About 110 men are employed underground, and about 375 tons of ore are sent to the mill daily. Including waste and shipping ore, about 500 tons of rock are hoisted per day.

*Mace*—This Federal property is producing 625 tons per 24 hours, with a working force of less than 375 men; about 225 are employed on production. Ore is being stoped above the 1200- and 1400-ft. levels, west. Drifting west on the 1600 has advanced nearly 400 ft. and the shaft is almost to 1800 ft. Frank Davis is acting superintendent.

*Snow Storm*—A daily production of 300 tons is being maintained with a working crew of about 80 men. Stoping is being done on four levels above the No. 3 main entry tunnel. The No. 4 tunnel, 550 ft. below the present working level, has been advanced about 3000 ft. Fred McCormick is mine superintendent.

*Morning*—About 1000 tons of ore are being mined and milled per 24 hours at this Federal property. An underground force of about 260 men is employed. Ore is being stoped from the levels between the No. 6 entry tunnel and the No. 5, 800 ft. above. The new shaft has been sunk 200 ft. and the station cut on the No. 6. Charles K. Cartwright is superintendent.

## Illinois

The Zeigler mines, Franklin county, have been sold by Joseph Leiter to the Bell-Zoller Coal Company, of Chicago. The new owner is making arrangements to reopen the mines, and will employ union labor.

## Michigan

### COPPER

*Elm River*—This company is operating one drilling machine which is driving on an amygdaloid formation that was encountered by the southeast crosscut from the bottom of its exploratory shaft.

*Hancock*—No. 2 vertical shaft is down 2250 ft. and should encounter the No. 1 Hancock lode at 2500 ft. Developments on No. 3 lode continue encouraging.

*Superior*—This property is maintaining regular shipments to the mill with about the same high average of mineral yield. No. 1 shaft is down to the 14th level and

the levels above are being extensively opened. No. 2 shaft is reaching a depth where good copper ground should be encountered when lateral openings are started.

*Ojibway*—Drifting 1250-ft. level of No. 1 shaft is under way. Drifts from the 500- and 650-ft. levels continue and machines will soon be at work on the 950- and 1100-ft. levels.

*Laurium*—The shaft at this property is to the 400-ft. level with good copper ground in evidence both in the shaft and in the lateral openings from the levels above.

#### IRON

*Independent Iron Company*—This Marquette company has been incorporated in Arizona, with a capital of \$1,000,000. Its officers are: President, John A. Russell; vice-president, Capt. John T. Spencer; secretary, Wm. L. White; treasurer, McArthur Rittenhouse, all of Detroit with the exception of Captain Spencer, who is of Iron Mountain, Mich. The company has acquired the holdings of Captain Spencer in the Lake Superior country. It is the intention to develop the Spencer property northwest of Iron Mountain. Exploration will be conducted at various properties, among them the old Erie mine on the Marquette range.

#### Missouri

##### JOPLIN ZINC-LEAD DISTRICT

The Alabama mill owned by Jamot Brown at Porto Rico was burned, as was also the Red Ant mill east of Carthage.

J. M. Short has made a strike in the Thoms Station camp north of Joplin of an 18-ft. face of ore at the 152-ft. level and 10-ft. at the 152-ft. level on the Brinkerhoff land.

*Granby*—This company has started mining at Oronogo in the east end of the old camp. This tract has been mined to the 160-ft. level and a great many rich mines worked. The company has put down a great number of drill holes and demonstrated the deeper run that is found at the Oronogo circle and has installed two pumping plants of 1700 gal. capacity.

##### MADISON COUNTY

*North American Lead Company*—This company has gone into the hands of a receiver. W. B. Doddridge, of St. Louis, has been appointed.

#### Montana

##### BROADWATER COUNTY

*Black Friday*—Sinking has been resumed at the 400-ft. level and will be continued to 500 feet.

*Ohio-Keating*—New machinery has been arriving, and when the electric-power line is completed, sinking will be resumed. The lease and bond which the company held on the Ohio mine has been taken up by the company.

*Surprise, No. 2*—A Seattle syndicate has purchased the mine in the Radersburg district. A 200-ft. shaft will be sunk.

#### BUTTE DISTRICT

*Red Metal*—No hoisting is now being done through the Rarus shaft, the Tramway alone being used. At the Rarus the only work which has been done during the last month is the running of a drift on the 2200-ft. level. About 1300 tons are being hoisted daily through the Tramway shaft.

*Amalgamated*—At the Mountain View mine the air shaft is now down a few feet below the 1200-ft. level and will be sunk until the 1800-ft. mark has been reached. On the 1400-ft. level the drift being run east to connect with drift west from the West Colusa should be finished soon. About 1400 tons are being hoisted daily. At the Pennsylvania mine, between 1200 and 1300 tons are produced per day. At the Badger State mine the shaft is now down 1730 ft. and sinking will continue to 1800 ft. where a station will be cut. No station will be cut between the 1300- and 1800-ft. levels. On the 1300-ft. level a crosscut, now in about 400 ft., is being run south to intercept the North Butte's Edith May vein. A small amount of ore is being mined on the 1300-ft. level, but it is being stored in bins at the surface.

*Butte Central*—The Ophir mine of this reorganized company will resume. The shaft is down 500 ft. and will be sunk to 1500.

*North Butte*—Thompson, Towle & Co. say: "The agitation between the North Butte and Tuolumne companies over the ownership of a portion of the Jessie vein is evidently at an end, for it is understood that the question of proportionate division of profits from the working of the narrow strip jointly owned by these companies is now receiving consideration. This would indicate that the Tuolumne company now recognizes North Butte's ownership of the ground so long in dispute. Also it is officially stated that all developments to date clearly indicate that all this ore apexes in North Butte ground, and North Butte owns all of it except the portion under the jointly owned ground."

##### FERGUS COUNTY

*West Kendall*—Operations at the mine have been resumed and it is planned to erect a mill.

##### JEFFERSON COUNTY

*Lahrer*—A lease and bond has been taken on the group which adjoins the Boston & Alta. Two shafts, each about 150 ft. deep, are already on the property.

*London & Corbin*—The tunnel is now in 275 ft. and sulphide ore has been encountered.

*Minnie Shea*—Dr. J. H. Reed, of Butte, has taken a bond on this mine in the Corbin district. The shaft on the property is 100 ft. deep and an 18-in. body of ore has been opened.

*Chicago & Alta*—The company owns the Surprise and Euberta quartz claims, adjoining the Bertha, Hidden Treasure and Alta mines, Corbin district. A two-compartment shaft has been sunk 150 ft. from the bottom of which drifts have been run east and west 180 ft. In addition to this, 700 ft. of tunnel and drifts have been run.

#### YELLOWSTONE COUNTY

*Ontario Nickel and Copper Company*—This company, capital \$2,000,000, has been organized by I. T. W. LaFramboise and John C. Thurston, of Chicago, George W. Savage, of Butte, and John B. Annin, of Columbus, Montana.

#### Nevada

##### CHURCHILL COUNTY

*Fairview*—The consolidation of the Fairview-Eagle and the Nevada Hills properties seems to assure the erection of a big reduction plant in the camp. Tests show the ore to be well suited for concentration and cyaniding. Interested in the consolidation are George Wingfield and associates, and prominent operators in Salt Lake City.

##### ESMERALDA COUNTY

*Grizzly Bear*—The shaft is now down 1175 ft. making it the deepest in the Goldfield district. The junction of the St. Ives and Jumbo vein systems is looked for at 1200 feet.

*Atlanta*—Seven leases are in operation on the property.

##### LANDER COUNTY

*Shoshone Quicksilver Company*—This company claims to be developing extensive deposits of high-grade quicksilver ore near Austin. W. J. Davis, of Salt Lake City, is secretary.

##### NYE COUNTY

Weekly ore shipments from Tonopah are: Tonopah, 3300 tons; Belmont, 600; Montana-Tonopah, 921; MacNamara, 250; West End, 120; Tonopah Extension, 750; Midway, 100; total, 6041 tons.

*Tonopah-Belmont*—Workmen are making alterations on the stamp mill at Millers which will shortly resume after six months. At the mine a new surface plant will be installed. Developments underground promise a production up to the mill requirements.

*Eclipse*—The cyanide department of the mill at Bullfrog will be completed shortly, when the tailings from the plates which have been impounded will be leached.

*Keane Wonder*—Nearly \$25,000 in bullion resulted from the March operations.

*Aurora-Bullfrog*—As soon as patent titles are obtained on the 18 claims at

Pioneer, a compressor and drills will be started on development.

#### WASHOE COUNTY

*Comstock Tunnel Company*—This company which was recently listed on the New York Stock Exchange owns 5000 acres of mineral ground, comprising the congressional grant to Adolph Sutro, and other ground in the Carson valley; also the Sutro tunnel and its branches approximating  $7\frac{1}{2}$  miles in length built to drain the Comstock Lode mines. The company also owns the Leonard Reduction Works and equipment at the mouth of the tunnel. The capital of the company is \$4,000,000, and the bond issue was \$2,769,000.

*Nevada-Commonwealth*—The smeltery at Reno has been sold to J. S. Loder and will be remodeled.

#### New Mexico

Oil has been found in a 1300-ft. well at Camp City, 10 miles north of Alamogordo. Many claims are being taken on the strength of the flow.

#### BERNALILLO COUNTY

*Providence*—This copper company of Denver is doing development in Hells Cañon district.

*Octoroon*—The company has a 45-ft. shaft with drift of 60 ft. A 110-ft. tunnel as in ore. Three hundred tons of low-grade lead ore is on dump and 200 tons of high-grade fluorspar. W. C. Thaxton is secretary.

#### Pennsylvania

##### ANTHRACITE COAL

*Lehigh Valley Coal Company*—Work has begun to recover what coal there is left in the Morris Ridge colliery, west of Centralia. The property was formerly leased by May, Troutman & Co., but was abandoned 20 years ago. At present the Lehigh Valley is pumping out the workings and installing hoisting machinery.

*Losberry Coal Company*—The breaker near Pottsville, was destroyed by fire April 13. The colliery is owned by Warnke Brothers, of Scranton. It will be rebuilt.

*Susquehanna Coal Company*—This company has bought a chemical fire engine to be used to extinguish fires in the mines. The advantage of an engine of this character are its portability and adaptability; while the use of chemicals prevents the spread of noxious gases.

##### BITUMINOUS COAL

*Pittsburg Coal Company*—This company reports for the three months ended March 31 earnings over operating expenses of \$792,538. Charges were, for depletion of coal lands, \$173,982; depreciation of plant and equipment, \$225,272; interest on bonds, \$248,013; total, \$647,267, leaving a surplus of \$145,247. As compared with the first quarter of

1909 the earnings increased \$363,538; while the surplus above compares with a deficit of \$165,454 last year.

#### Utah

##### JUAB COUNTY

*Mammoth*—Drifting is being done on the 1300 level in search of the orebody in the Don Pedro claim, which was recently developed by the Gold Chain. These two companies own the Don Pedro.

*Grand Central*—The mine is in good condition, and shipments are being made regularly. The underground showing is reported better than at any time during the last few years.

*Bullock*—A flow of water recently encountered in the shaft at a depth of 215 ft. made it necessary to abandon sinking. A hoist and pump will be installed and sinking continued to the 300-ft. level.

*Centennial-Eureka*—Work is being done in the tunnel connecting with the shaft at the 535-ft. level. Arrangements for carrying off the water have been completed, and the tracks are being laid. The power plant which is being erected at the mouth of the tunnel is being built rapidly. Work of mining ore was suspended on April 10 until the new electric pumping plant is installed.

*Iron King*—From 40 to 50 tons of ore are being mined daily and are shipped to the American Smelting and Refining Company for fluxing. The tunnel is in 2500 ft. and will be driven 500 ft. further. N. Roberts is superintendent.

*Scranton*—This company in North Tintic is shipping from 600 to 700 tons of lead-zinc ore per month.

*Iron Blossom*—Ore has been encountered in the raise from the 500-ft. level of the company's north workings, which is in part of shipping grade. The east drift on the 500 has been following a partly open fissure. A raise was driven on this fissure, which broke into characteristic silver-lead ore. This orebody is being developed.

*Eagle & Blue Bell*—The orebody on the 1000-ft. level has been opened for about 200 ft., and for some distance both above and below the level. Ore has been opened in the eastern part of the 1100-ft. level. It is said that arrangements have been made for sinking the shaft, as the showing at present justifies deeper mining.

##### SALT LAKE COUNTY

*Bingham Mines*—This company is actively operating its properties. The Commercial mine is being worked about as usual. At the Dalton & Lark the ore mined is more than taking care of development. Considerable work is being done on the Yosemite properties. A porphyry dike has been driven through, and the upper workings are being unwatered. No ore is being mined at the present time,

and the company is confining its attention to development. The new workings will give a much greater depth than the bottom of the lowest work formerly done on the property. About 700 ft. south of the Yosemite, a long drift is being sent under the old shaft workings in the Brooklyn ground.

*Carbonate*—This property on Custer peak above Big Cottonwood cañon has been lying idle for years. A vigorous campaign of development will be started and continued.

*Columbus Consolidated*—Development is being continued on the third and fourth levels. On the fourth level a drift is being driven northwest in new territory. Some milling ore has been encountered. The third level is being driven south of the shaft to cut an ore-bearing fissure which was developed in the upper workings a force of 40 men is employed.

#### Washington

##### FERRY COUNTY

*North San Poil*—This mine has been leased to W. M. Crummer for two years, and development will be started.

*Insurgent*—Merrill Brothers & Delbridge, of Republic, are operating this mine and will equip it.

*Copper Key*—Operations under the direction of Jack May are being carried on.

##### OKANOGAN COUNTY

*Lucky Knock Mining Company*—This company, of Loomis, reports that it has just cut through the largest body of high-grade stibnite ore yet encountered in its mine. At 350 ft. a tunnel went through 50 ft. of ore assaying 35 per cent. antimony and through a streak, 14 ft. thick, assaying 60 to 70 per cent. Some of the ore carries silver.

##### STEVENS COUNTY

*Big Bear*—Development is in progress under the direction of Charles H. Albin, of Spokane.

*Blue Star*—The present shaft will be continued to the 300-ft. level. Mark Mitchell is manager.

*Conquest*—At this property a rich strike of gold and copper ore was recently made. The mine is six miles north of Northport.

#### West Virginia

##### HARRISON COUNTY

The new Peacock Coal Company, of Clarksburg, is preparing to develop its coal and timber lands and to lay out a townsite; while the Monongah Fuel Company will soon open up coal mines in the clay district.

##### LOGAN COUNTY

The Island Creek railroad is to be extended up the creek, to enable the United States Coal and Oil Company to extend its mining operations; and a tunnel may be also driven through Din-



gess mountain to make a connection with the Norfolk & Western.

#### MINGO COUNTY

The Borderland Coal Company is opening new mines on its lease and is installing an aerial tramway, which will take the coal from the mines in Kentucky, across Tug river. Besides the Borderland, or Winifrede seam, the company is opening the Thacker lower in the hill.

John A. Williams, of the Marvin Coal Company, Matewan, has organized a company which has purchased the Sprigg plant from the Belvedere Coal Company, and is getting ready to reopen the mines. It is working the Alma seam.

#### Wyoming

##### ALBANY COUNTY

The Medicine Bow company will commence milling by July. This property is between Holmes and Albany. The Lake Creek and Topeka companies have considerable developed ore and will ship from Lake Creek station. William Benton is secretary of the Lake Creek company.

#### Canada

##### BRITISH COLUMBIA

*New Dominion*—The British Columbia Copper Company interests have practically secured control of the company. Julius A. Lewisohn and J. H. Susmann have resigned as president and secretary respectively and been succeeded by E. Summerfield and C. A. Starbuck representing the British Columbia company, giving the latter company four members on the board. Lucius W. Mayer is mentioned for successor to Mr. Lewisohn as president. A contract has been approved for the trial treatment of New Dominion ores at the British Columbia smeltery to enable the two companies to determine what terms will be fair for both.

*British Columbia Copper*—A labor strike is threatened owing to the activity of the Western Federation.

##### ONTARIO

The shipments from Cobalt for the week ended April 15 are: La Rose, 313,782 lb.; Kerr Lake, 238,444; Nipissing, 208,631; McKinley-Darragh, 148,550; Crown Reserve, 83,800; Townsite, 68,000; Chambers-Ferland, 64,300; Buffalo, 62,650; Cobalt Lake, 64,000; total, 1,252,157 pounds.

*Cobalt Central*—This company will issue \$300,000 of bonds.

*Little Nip*—Another rich oreshoot has been opened up below the 160-ft. level.

*City of Cobalt*—A new vein carrying 1000 oz. of silver to the ton has been located on the 165-ft. level.

*Merger Mines Company*—This company, capitalized at \$3,000,000, has acquired control of the Laurentian gold mine in the Manitou Lake district, west-

ern Ontario, and other properties, amounting to 1200 acres. Preparations are being made to resume active development work at the Laurentian. E. E. Hedges, Boston, is president; J. P. Kaiser, Detroit, vice-president, and John B. Corliss, Detroit, secretary. F. Hille has been engaged as consulting engineer.

##### NOVA SCOTIA

*Dominion Iron and Steel Company*—At a joint meeting of the directors of this company and the Dominion Coal Company at Montreal, April 20, a proposition for the accomplishment of the merger was adopted for submission to the shareholders. It is proposed to form a holding company, to be entitled the Dominion Steel and Coal Corporation, Ltd., which will take over the common shares in both companies, share for share at par, and will in addition give the holders \$4 for each share, to be paid in quarterly instalments, the first payment to be made July 1. The plan is understood to meet the approval of the larger shareholders.

##### QUEBEC

*Eastern Canada Steel and Iron Works, Ltd.*—This company, recently organized with a capital of \$200,000, has secured land at St. Malo, on the outskirts of Quebec city, for the erection of a plant for the manufacture of structural steel. Work will be started during May. It is intended to issue bonds for \$50,000. The directorate includes Rodolphe Forget, president; Charles Donohue, vice-president; J. T. Donohue, secretary-treasurer, and L. H. Gandry, managing director.

##### Mexico

##### CHIHUAHUA

*San Pablo*—This newly organized El Paso company has begun development on silver properties near Ojo Caliente station north of Chihuahua. The properties are said to have produced from little working upward of \$100,000 since 1893. Machinery will be purchased.

*Plomosas*—This productive lead mine in the eastern part of the State is reported by its owner Jose Lago to have been sold to French parties who will make a first payment on the \$200,000 price soon.

*Palmarejo-Mexican*—The properties of this company near Chinipas are reported acquired in large part by the Oceana Consolidated Company, an English concern which has operated successfully in South Africa for several years.

*Batopilas*—A recent bullion shipment consisted of 40 bars silver worth about \$22,000. The enlargement of the cyanide plant is planned.

*Los Americanos*—El Paso parties have lately organized this company to operate in the Duende mountains 50 miles southwest of Juarez.

*San Francisco del Oro*—Definite an-

nouncement comes from London that this company has perfected plans for the immediate building of a 300-ton milling plant in the Parral section.

*Sierra Madre*—At this property in the northern part of the State a large central power station is being installed. P. H. Durack is manager.

*Congress*—This property in the San Pedro camp on the Mexico Northwestern in the northern part of the State is shipping daily to El Paso over 100 tons of lead-silver ore.

##### DURANGO

*Avino*—London advices are to the effect that this company has not arrived at a definite decision as regards the ore-treatment problem. Tests have been made on two or three processes in London, and the results will shortly be submitted to the board. As regards the results obtained by the use of water concentration, the officials are as yet unwilling to give any information, but say they expect to do so shortly.

##### GUANAJUATO

*La Tula*—This property, W. H. Puffer, manager, will soon start work on installing a 10-stamp mill.

##### SONORA

*Lucky Tiger Combination*—Plans for the construction work drawn by D. L. H. Forbes and have been accepted by the directors. They cover the erection of a steam power plant at Ysabel station on the Nacozari railroad and a 31-mile electrical transmission line to the mines; a 250-ton cyanide plant, and the enlargement of the mill from 100 tons daily capacity to 200 tons. The power plant is to deliver 1000 h.p. The year's tonnage is expected to reach 75,000 tons.

*Cerro Prieto*—This is the Mexican holding corporation for the Black Mountain Mining Company, which will temporarily close down May 1. The company has spent \$2,568,000 at the property, other than operating expenditures, and has about \$150,000 in supplies and merchandise at the mine. Ore was mined and milled for a few cents less than \$2.20 per ton last year, and gross recoveries approximated \$497,000 in gold and silver. The company is capitalized with 500,000 shares at \$5 par value.

*Greene-Cananea*—A tunnel has been started at an outcrop in a virgin zone south of the Oversight mine.

##### Asia

##### INDIA—MYSORE

*Kolar Goldfield*—The production of gold in March is reported at 47,035 oz. bullion, or 1571 oz. more than in February. For the three months ended March 31 the output was 135,008 oz. bullion in 1909, and 139,047 oz. in 1910; an increase of 4039 oz. The bullion reported this year was equal to \$2,586,685, or 125,142 oz. fine gold.

# THE MARKETS

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

## Coal Trade Review

*New York, April 27*—The seaboard bituminous trade shows very little change, and is not affected by the wage-scale disputes, especially since the settlement in the Central Pennsylvania district, which has a large trade in the East. In that district there is an advance of 3c. per ton to 69c. for pick mining, and of 4c. to 40c. for machine mining; besides an increase of 5.55 per cent. on day work of all kinds. A new clause in the agreement provides for the appointment of a commission consisting of two representatives from the operators and two from the miners, and a fifth selected by the four, to keep watch on competitive fields, and when wages are reduced in them to make a corresponding reduction in this field. This was a concession to the operators, although the miners generally were granted practically all they asked.

In the West the course of settlement is uneven. The Pittsburg district is making its agreements gradually, and Indiana seems near a close, but Illinois is still far from an end. The Illinois miners have agreed to furnish the operators with men to make the changes in the mines required by the new State law.

West of the Mississippi the situation is chaotic, except in Iowa, and the resumption of mining is still uncertain.

The situation in various districts is shown in the local letters which follow.

**West Virginia Coal Lines**—Suits have been begun in Ohio to enjoin the transfer of Hocking Valley and Kanawha & Michigan stock to the Chesapeake & Ohio company, on the ground that the sale will be practically a consolidation of competing lines.

It is reported that negotiations are pending for the sale of the Virginian Railroad, owned by the estate of H. H. Rogers, to the New York Central & Hudson River Company. The object of that company, if the report is true, is probably to offset the Pennsylvania control of the Norfolk & Western.

### COAL TRAFFIC NOTES

Coal and coke tonnage originating on all lines of the Pennsylvania Railroad Company east of Pittsburg and Erie, three months ended March 31, short tons:

	1909.	1910.	Changes.
Anthracite .....	2,928,966	2,822,612	D. 106,354
Bituminous .....	9,193,532	11,267,286	I. 2,073,754
Coke .....	2,529,097	3,985,861	I. 1,456,764
Total .....	14,651,595	18,075,759	I. 3,424,164

The total increase reported this year was 23.4 per cent.

Coal report of Pittsburg Coal Company, three months ended March 31, short tons:

	1909.	1910.	Changes.
Pittsburg district.	2,130,389	3,485,055	I. 1,354,666
Hocking district...	160,084	290,752	I. 130,668
Total coal .....	2,290,473	3,775,807	I. 1,485,334
Coke made .....	96,046	146,867	I. 50,821

The increase in coal this year was 64.7 per cent.; in coke, 52.9 per cent.

Coal tonnage of railroads in Ohio Coal Traffic Association, two months ended Feb. 28, short tons:

	1909.	1910.	Changes.
Hocking Valley .....	471,013	771,414	I. 300,401
Toledo & Ohio Cent. . .	174,988	276,090	I. 101,102
Baltimore & Ohio . . .	172,327	373,438	I. 201,111
Wheeling & L. Erie . .	406,647	587,374	I. 180,727
Cleve., Lorain & Wh. .	283,800	487,543	I. 203,743
Zanesville & Western .	206,456	250,247	I. 43,791
Toledo Div., Pen. Co. .	308,205	435,077	I. 127,472
L. Erie, Alliance & Wh. .	177,751	203,960	I. 26,209
Marietta, Col. & Cleve. .	6,882	25,825	I. 18,943
Wabash-Pitts. Term. . .	.....	8,839	I. 8,839
Total .....	2,208,069	3,420,407	I. 1,212,338

Total increase this year, 54.9 per cent.

Only the Ohio lines of the Baltimore & Ohio are included; the main line tonnage is given elsewhere.

Bituminous coal and coke tonnage of leading railroads in Pennsylvania and West Virginia two months ended Feb. 28, short tons:

	Bituminous.	Coke.	Total.
Pennsylvania .....	7,256,090	2,654,301	9,910,391
Balt. & Ohio .....	4,168,536	770,393	4,938,929
Buff., Roch. & Pitts. .	1,240,391	116,849	1,357,240
Buff. & Susquehanna .	209,069	51,868	260,937
Penn. lines, N. Y. C. .	1,619,710	11,627	1,631,337
Pitts. & L. Erie .....	1,641,582	1,251,555	2,893,137
Pitts., Shawmut & N. .	160,336	4,821	165,157
Norfolk & Western . .	2,596,201	538,287	3,134,488
Ches. & Ohio .....	2,511,040	84,900	2,595,940
Virginian .....	.....	.....	.....
Total .....	21,402,895	5,485,201	26,888,096
Total, 1908 .....	16,214,305	3,643,240	19,857,545

Total increase this year, 7,030,551 tons, or 35.4 per cent. Anthracite tonnage of Pennsylvania and Baltimore & Ohio is not included.

Anthracite tonnage of Baltimore & Ohio, two months ended Feb. 28 was 163,824 tons in 1909, and 204,301 in 1910; increase, 40,177 tons.

## New York

### ANTHRACITE

*April 27*—There is no change in the anthracite market except that there is a little rush to get in orders before May 1, and so save the addition.

Schedule prices for domestic sizes are \$4.25 per ton for lump and \$4.50 for egg, stove and chestnut, f.o.b. New York harbor. On May 1 there will be an advance of 10c. per ton. For steam sizes current prices are \$3@3.25 for pea; \$2.15 @2.50 for buckwheat; \$1.70@2 for No.

2 buckwheat or rice; \$1.25@1.50 for barley. These prices are f.o.b. New York harbor, according to quality, the lower prices being for washery coals.

### BITUMINOUS

The seaboard bituminous trade is steadier and shows a little more activity. The settlement of the wage scales in the Central Pennsylvania district, signed this week, has removed some of the apprehensions of strike trouble. Contracts are being still slowly closed. Orders from the Sound and the far East are coming in a little more freely. New York harbor trade is fair and all-rail business is doing pretty well.

Car supply is better than it has been, though not quite up to the mark. Transportation is generally good, coal coming through about on schedule.

Prices are firm, the better grades of steam coal bringing \$3@3.15, f.o.b. New York harbor, with lower grades at \$2.75 @2.85. The lower priced coals seem to be most in demand.

The coastwise-vessel market is in pretty good shape. Boats are to be had without difficulty, and there is no change in prices.

## Birmingham

*April 25*—There is a fairly good demand for coal in Alabama and the production is being kept up. The home consumption is strong while quite a lot of coal is being shipped away from the State. New Orleans dealers are figuring on more contracts for Alabama coal and it is believed this trade during the summer will help out when conditions become slack in the home market. The railroads are giving good service in the way of handling the product.

Coke demand and production are about equal. But few coke ovens in shape are out of commission. The prices of coke are a little weaker than they have been.

## Chicago

*April 25*—Cold weather throughout Chicago territory for the last three days has caused an active demand for domestic coals, particularly anthracite. Stores of lump bituminous have been drawn on, but no pressure for coal has resulted, despite the fact that hardly any coal for steam purposes is available. So far as the steam market is concerned, there is still hardly any buying, except of the West Virginia coals that are in the market. The users of steam coals have by no means come to the bottoms of their

storage piles yet, nor do they seem likely to do so for two weeks more at least. Illinois and Indiana have used up their surplus stock, so that they have practically no more to send until the resumption of mining. The users of small amounts of coal are beginning to show anxiety and to seize eagerly available lots.

For such occasional lots of screenings as can be had, \$2.40@2.60 obtains; other Illinois and Indiana coals have no market and quotations are only nominal. Smokeless brings \$3.55 for lump and egg and \$3.15 for run-of-mine and sells very well, all kinds bringing these prices. The supply is not more than enough to keep pace with the demand.

**Cleveland**

April 25—The coal market is practically dead for the time being. Sales are very few and large consumers are running on their stored coal. Some of them are approaching the end of their supplies. Practically the only coal sold during the week has been some No. 8 district slack, which brought high prices, as that grade is very scarce.

**Indianapolis**

April 25—The Indiana mining situation has been waiting this week on the next move. The miners as well as the operators are getting tired of the strike that has dragged out for three weeks. They have heard of the revival of business in the block coalfield, and believe that the storage coal is almost exhausted and that factories and railroads are hard pressed. The miners continue to quibble over the Cincinnati agreement to work pending a settlement. The majority are anxious to resume work but the officials refuse to order them back to work. The operators say they do not expect President Lewis to order the men back to work and do not know if he has the power to do so.

Another joint conference between the miners and operators has been arranged to be held in Terre Haute this week. There is some hope that a settlement will be effected. The suspension of mining in this State has resulted in the curtailment of production in some factories because of the lack of coal.

**Pittsburg**

April 26—Eight mines in the district have signed the wage scale provisionally, with the advance from 90 to 95c. for pick mining, advances for machine mining, and 5.25 per cent. advances on day work. These signatures are provisional upon the rest of the district signing later. At six of these mines the men have already gone back to work. The operators who have not signed are almost wholly those having one or more gaseous mines in which black powder is not permissible,

and as the men will not permit these to sign unless they sign for all their mines, with a mine-run basis, at the 65 per cent. ratio, for those in which black powder cannot be used, the matter rests at this point. A meeting of the Pittsburg Coal Operators' Association will be held tomorrow afternoon at which some step may be taken. While definite statements are lacking, prospects are that the whole matter will be adjusted before the end of the week so that the mines can run next week.

A sharper scarcity of coal has developed in the past four or five days, as a number of consumers ran out of stocks. Coal is to be had from nonunion mines, at 10 or 20c. premium over the regular market, and it is only a relatively small proportion of consumers who have to pay a large advance in delivered prices, through their being inconveniently located as to nonunion mines. The market for small lots for immediate shipment is quotable at \$1.15@1.30 for mine-run, and at \$1.20@1.30 for slack, the market for the latter being a trifle stiffer than for mine-run, there being a number of consumers in the market equipped to use slack only. Occasionally as high as \$1.50 has been paid for an odd carload.

**Connellsville Coke**—The market has been very quiet. Late last week there was a little inquiry for prompt furnace coke, developing many sellers at \$1.70. Quotations this week are \$1.75@1.85, although actual inquiry might again develop \$1.70. Contract furnace coke is quotable at \$2.15@2.25, but \$2 could probably be done on negotiation. Foundry coke is quotable at \$2.25@2.35 for prompt and at \$2.35@2.50 for contract.

The *Courier* reports the production in the Connellsville and lower Connellsville region in the week ending April 16 at 438,374 tons and shipments at 4452 cars to Pittsburg, 7512 cars to points west of Pittsburg and 838 cars to points east of Connellsville, a total of 12,802 cars.

**St. Louis**

April 25—The operators disbanded in Chicago again without doing anything and will not meet for another week; consequently, there is no chance of work being resumed before the middle of May at least. Even should the other States sign up it will have no effect on the conditions in Illinois. After the general scale is agreed to there is another point which will come up in the Illinois convention which will undoubtedly cause a good deal of delay and trouble—both the miners and operators of the central and northern Illinois districts insist that the differential of the Southern Illinois or Carterville group be changed and that the mines be put on an equal basis with the Belleville, Standard and Springfield districts. The Carterville operators now enjoy an advantage of 7c. per ton in

the mining rate over these districts; also in the Carterville district the miners do the slate cleaning and other dead work which amounts to 5c. per ton more. Carterville coal has eaten into the market of the northern coals to such an extent during the last 18 months that not only the operators in the northern districts, but miners themselves realize the necessity of making this change. This proposed differential will be vigorously fought by the operators in the Carterville district.

Kentucky coal is beginning to move. Some has been coming into East St. Louis for the past two weeks, although the tonnage has been small. However, it begins to look as if after next week that there would be a great deal of this coal brought this way. Operators in Kentucky have been holding their coal at 80@90c. but on account of increased demand have raised their price to \$1@1.10 per ton at mine on mine-run coal, which is practically the only size moving.

Prices in the St. Louis market are as follows:

	F.o.b. Mine.	F.o.b. St. Louis.
Standard:		
2-in. lump	2.00	2.52
Mine-run	1.60	2.12
Screenings	1.40	1.92
Carterville:		
6-in. lump or egg	2.00	2.67
Mine-run	1.50	2.17
Screenings	1.50	2.17
Pocahontas and New River:		
Lump or egg	1.50	4.00
Mine-run	1.10	3.65
Pennsylvania Anthracite:		
Nut, stoye and egg		6.45
Grate		6.20
Arkansas Anthracite:		
Egg or grate	3.35	5.35
Coke:		
Connellsville foundry		5.40
Gas house		4.50
Smithing coal		4.15

Kentucky coal brings \$2.50 for 3-in.; \$2.25 for 1-in.; \$2 for run-of-mine; and \$1.75 for screenings; all f.o.b. on Louisville & Nashville tracks, East St. Louis.

**FOREIGN COAL TRADE**

**Nova Scotia Coal**—Shipments of coal from Nova Scotia mines, three months ended March 31, long tons:

Companies.	1909.	1910.	Changes.
Dominion	377,167	510,111	I. 132,944
Nova Scotia Steel	81,247	103,565	I. 22,318
Acadia	57,867	64,717	I. 6,850
Intercolonial	60,911	59,283	D. 1,628
Inverness	26,412	59,468	I. 33,056
Total	603,604	797,144	I. 193,540

The total increase reported this year was 32 per cent.

**German Coal Production**—Production of German Empire, two months ended Feb. 28, metric tons:

	1909.	1910.	Changes.
Coal	23,562,253	24,141,063	I. 578,810
Brown coal	10,892,060	10,872,315	D. 19,745
Total mined	34,454,313	35,013,378	I. 559,065
Coke made	3,428,731	3,697,953	I. 269,222
Briquets made	2,884,356	3,016,768	I. 132,412

Of the briquets reported this year, 2,331,253 tons were made from brown coal, or lignite.

## IRON TRADE REVIEW

New York, April 27—Very much has been said about decreasing consumption of iron and steel, which does not take existing conditions into account. As a matter of fact the consumption is large in some lines, and good in nearly all, but it is not up to the increase in producing capacity which has been made in the last three years. A large part of the apparent dullness may be traced to this cause. If we predicate production on a boom year and then increase it 20 per cent., some mills are bound to be short of work. Sales of small building material are reported very large, which is an encouraging point.

In pig iron there is more inquiry for third-quarter and second-half supplies. Furnaces seem to be gradually adjusting themselves to the situation and are more ready to accept small reductions in price. Moreover, though there is no concerted movement, some stacks are going out of blast and thus reducing the surplus which has been weighing on the market.

In finished material bars and plates are in good demand, and there is much small business in structural steel and bridge material, which makes up a fair total. The railroad people have been giving a few more orders, especially for bridge work.

**United States Steel Corporation**—The report made public for the quarter ended March 31 gives the following figures; net earnings being the amount remaining after paying all expenses, repairs and ordinary charges:

Net Earnings:	1909.	1910.
January.....	\$ 7,262,605	\$11,316,014
February.....	7,669,336	11,616,861
March.....	7,989,327	14,084,001
Total.....	\$22,921,268	\$37,616,876
Depreciation, replacement, etc.....		\$6,113,682
Interest and sinking funds.....		7,311,963
Total charges.....		\$13,425,645
Surplus.....		\$24,191,231

Appropriations from surplus were \$6,304,919 for 1¼ per cent. dividend on preferred stock; \$6,353,781 for 1¼ per cent. on common; \$5,000,000 for additions to property; total, \$17,658,700, leaving an undivided surplus of \$6,532,531. The common stock dividend is increased from 1 to 1¼ per cent.

Net earnings decreased by \$3,354,433 from the quarter ended Dec. 31. Unfilled orders on the books, March 31, were 5,402,514 tons; a decrease of 524,517 tons from Dec. 31, but an increase of 1,859,919 tons over March 31 last year.

### Baltimore

April 25—Iron ore imports for the week were 28,150 tons, all from Cuba. Exports included 1,384,787 lb. castings, bars and pipe to Panama.

### Birmingham

April 25—While there are some sales of pig iron being made in the Southern territory, the market is still quiet. A curtailment of production has started in, one or two furnaces having already been blown out and one more is going out. Quotations are a little better than they have been. Furnace companies are not willing to sell under \$12.50 per ton, No. 2 foundry, as far as can be ascertained. A few sales have been made at \$12.75 and iron for delivery during the fourth quarter of the year was booked at \$13 per ton. There is nearly 200,000 tons of pig iron on the furnace and warrant yards in the Southern territory but this does not alarm producers. The smaller iron companies in the South appear to be making the greater concessions and also the greater number of sales. Reports are current now that some of the largest consumers in the South are figuring on buying for their probable needs during the latter part of the year. Inquiries are being received right along but little business is resulting. Business of recent acceptance is practically for immediate delivery.

The steel activity remains unchanged. The plant of the Tennessee company at Ensley and the rolling mills of the same company at Bessemer are producing a good quantity of steel and it is being shipped as quickly as it is manufactured.

### Chicago

April 25—Conditions in the pig-iron market seem to be improving. Both sales and inquiries are increasing. Buyers appear to be ready to place large contracts as soon as they feel convinced that prices will not go lower. That they will not go under \$12 Birmingham (\$16.35 Chicago) for Southern No. 2, and \$17 for Northern No. 2 is asserted by furnace agents. There are rumors, however, that on both Southern and Northern these quotations have been shaded 25 or 50c. on some sales. In any event most of the iron sold is in small lots, at or near these quotations. The ordinary melter of pig iron adheres to his policy of buying for short-time requirements—one to three months ahead. Inquiries are much more numerous and for good-sized tonnage. Much iron is needed to fill last-half requirements. Railroad supplies and structural iron show no increase of sales, but much business is in sight. Coke is somewhat stronger, the surplus on track having been largely reduced.

### Cleveland

April 26—Nothing is doing in the iron-ore market, as might be expected from general conditions.

**Pig Iron**—There is little new business and prices are weaker. Several furnaces in this district are expected to go out soon. Bessemer pig can be bought at

\$18, Cleveland, while \$16.50@16.75 is quoted for No. 2 foundry; \$16.35 for No. 2 Southern; \$16.25@16.50 for gray forge.

**Finished Material**—Some small contracts for structural steel have been let and others are pending. Bars are selling fairly well, but otherwise the market is quiet.

### Philadelphia

April 27—A feeling of uncertainty is manifested this week in the entire pig-iron market. Reports from outside territory as to blowing out of furnaces and a curtailment of production are having a discouraging effect which may result in a general lowering of quotations. A drop in basic is believed to be inevitable. Forge iron has weakened slightly according to quotations made today. The undertone of the entire crude-iron market is not quite as strong as a week ago. Basic is quoted at \$17.25; gray forge \$16.75, and No. 2 foundry \$18 per ton.

**Steel Billets**—There is a marked tendency to weakness in billets, excepting for small billets which demand full prices.

**Bars**—Bar iron sells freely, but in small lots. Inquiries this week for car lots show that manufacturers are willing to make a slight shading.

**Sheets**—A few of the large sheet consumers have submitted offers for summer and later delivery involving, of course, concessions from current quotations. Sheet manufacturers are well sold up, but they are showing an anxiety to capture desirable orders from the larger consumers.

**Pipes and Tubes**—There are signs of weakness in demand, but there is no restriction in consumption.

**Plates**—Notwithstanding the oversold condition of Eastern plate mills, outside prices are not insisted upon in some cases. Boiler plate is strong and there is no sign of weakness in the retail business.

**Structural Material**—The week's business has been confined to small orders for local enterprises. The mills in this territory have a smaller amount of unfilled orders than for some months. There is no admitted shading on these small orders.

**Scrap**—The small sales taking place are of cast scrap, cast borings and some yard scrap. The yards, as a rule, are better supplied with scrap than for some months.

### Pittsburg

April 26—With a few exceptions, notably wire and pipe, actual orders for finished steel products are in excess of current production, and while the showing is favorable in a measure, it furnishes a continuance of the disappointment which has been felt for weeks, since the

mills are not getting much ahead, and the inevitable dull period in the summer will set them far back. Reduced output of finished steel is inevitable, but this is not likely to be serious in the next two or three months, since there is really a good accumulation of business on books in most lines. The Pittsburg Steel Company has not started its steel and wire plant at Monessen, this being the third week of its idleness, but as soon as coal can be secured at the normal cost it will probably resume, having effected a sufficient curtailment. The McKeesport plant of the National Tube Company has closed several butt-weld departments and the 15-in. mill.

Prices of finished-steel products have been showing no material change in the past few weeks, although it seems clear that the market has lost a little of its strength. In some quarters the theory is put forth that the Steel Corporation is pursuing a very conservative course on account of the prospect of a national incorporation law, and that once it were lodged in what it seems to look upon as a safe position, it would cut the market open and take business at whatever prices were necessary, precipitating a conflict for the survival of the fittest.

Independent steel interests are laboring hard with the wage question, which has been forced upon them by the Steel Corporation's announcement of a general wage advance May 1, but it is far from certain that they will decide to advance wages. They regard the Steel Corporation's position as utterly unsound, and obviously it is off color to advance wages and curtail production at the same time. They may do nothing, leaving the Steel Corporation's advance to be attributed to its being in a peculiar position on account of the state of public feeling. The Corporation has announced its sheet- and tin-mill advances, which amount to about 4 1/2 per cent. in the tin mills and slightly less in the sheet mills. Steel, tube, wire, etc., advances are expected to be announced in the next few days.

**Pig Iron**—Not enough business has been done to maintain a market, and it is possible that former prices could be shaded, but in the absence of definite movement former prices are quoted as nominally the market: No. 2 foundry, \$15.75; malleable, \$16; gray forge, \$15.25; bessemer, \$17.50; basic, \$16; all f.o.b. Valley furnaces, 90c. higher delivered Pittsburg.

**Steel**—Open-hearth steel continues scarce and bessemer steel easy, the latter being quotable at 50c. less than last week. Open-hearth billets are \$28.50@29; open-hearth sheet bars, \$29@29.50; bessemer billets, \$26.50@27; bessemer sheet bars, \$27@27.50; rods, \$32; all f.o.b. mill, Pittsburg or Youngstown districts.

**Ferromanganese**—The market is de-

cidely softer, with occasional sales at under the market on account of the limited absorbing power for odd lots which have to be moved. The market may be quoted at about \$40.50@41 for prompt, and \$41@41.50 for second quarter or second half, f.o.b. Baltimore, freight to Pittsburg being \$1.95 per ton.

**Sheets**—The market is rather quiet, but most mills are busy. Here and there a slight curtailment of output has been made. Regular prices, which are frequently shaded \$1 or \$2 a ton, are 2.40c. for black and 3.50c. for galvanized; \$1.70 for painted corrugated, and \$3 for galvanized corrugated, with blue annealed, 10 gage, at 1.90c. for prompt delivery.

**St. Louis**

**April 25**—The pig-iron market has been very dull and there does not seem to be any prospect of immediate improvement. The demand is light and inquiries are few. Scarcely a contract worth mentioning has been written in the past month. Local producers have all they can do, but there is an over-abundance of Southern iron on the market. Birmingham No. 2 foundry is bringing \$13 Birmingham or \$16.75 St. Louis. Producers are asking an advance of 50c. over these prices for third-quarter delivery.

**FOREIGN IRON TRADE**

**British Iron Trade**—Exports and imports of iron and steel in Great Britain, three months ended March 31, as valued by Board of Trade returns:

	Exports.	Imports.	Excess.
Iron and steel	£10,112,678	£ 2,133,798	Ex. £ 7,978,880
Machinery	6,369,735	1,090,477	Ex. 5,279,258
New ships	2,420,254	.....	Ex. 2,420,254
Total	£18,902,667	£ 3,224,275	Ex. £15,678,392
Total, 1909	17,175,819	3,006,283	Ex. 14,169,536

Increase in exports, £1,726,848, or 10.1 per cent.; increase in imports, £217,992, or 3.3 per cent. The quantities of iron and steel reported were in long tons:

	1909.	1910.	Changes.
Exports	931,403	1,095,786	I. 164,383
Imports	277,887	323,966	I. 46,079

Exports of scrap iron and steel, not included above, were 39,497 tons in 1909, and 52,515 tons this year.

**British Iron-ore Imports**—Imports of iron ore into Great Britain, three months ended March 31, were 1,363,042 long tons in 1909, and 1,797,292 in 1910; an increase of 434,250 tons. Of the imports this year 1,277,121 tons were from Spain.

**German Steel Production**—The production of steel in Germany for the full year is reported as below, in metric tons:

	1909.	1910.	Changes.
Acid converter	374,100	151,148	D. 222,952
Acid open-hearth	224,211	311,812	I. 87,601
Basic converter	6,510,754	7,517,451	I. 1,006,697
Basic open-hearth	3,969,595	3,967,581	D. 2,014
Crucible	88,183	84,069	D. 4,114
Electric	19,536	17,773	D. 1,763
Total	11,186,379	12,049,834	I. 863,455

The total increase was 7.8 per cent.

**METAL MARKETS**

**New York, April 27**—The metal markets are inclined to be more active and are interesting in some of their developments.

**Gold, Silver and Platinum**

**UNITED STATES GOLD AND SILVER MOVEMENT**

Metal.	Exports.	Imports.	Excess.
<b>Gold:</b>			
Mar. 1910	\$ 1,815,329	\$ 4,492,229	Imp. \$ 2,676,900
" 1909	21,252,462	5,161,648	Exp. 16,090,814
Year 1910	10,915,595	9,686,702	" 1,228,893
" 1909	37,978,632	12,158,275	" 25,820,357
<b>Silver:</b>			
Mar. 1910	4,553,110	3,872,912	Exp. 680,198
" 1909	5,079,287	3,279,531	" 1,799,756
Year 1910	13,640,033	11,276,595	" 2,363,438
" 1909	14,473,930	10,453,218	" 4,020,712

Exports from the port of New York, week ended April 23: Gold, \$6,797,600, to London and Brazil; silver, \$474,500, chiefly to London. Imports: Gold, \$52,131; silver, \$10,036, from the West Indies and Mexico.

**Gold**—The price of gold on the open market in London was 77s. 9d. per oz. for bars. The price for American gold coin was 76s. 5d. per oz., but for two days the Bank of England offered a premium of 1d. per oz. for coin. A large amount—about \$12,500,000—was taken early in the week for shipment to London.

**Platinum**—Business is good for this time of year. Prices are unchanged, dealers asking \$29@29.50 per oz. for refined platinum and \$34.50 per oz. for hard metal.

Our Russian correspondent writes, under date of April 14, that prices are still increasing. At Ekaterinburg quotations are 6.40 rubles per zolotnik—\$24.06 per oz.—for crude metal, 83 per cent. platinum; at St. Petersburg 25,500 rubles per pood—\$24.99 per oz.—for the same grade. Demand is good and the market strong.

**Silver**—The market has ruled steady for the past week with advancing tendency, owing to the good demand from India and China, and the promising crop outlook; also the probability of Indian Government purchases in the near future.

**SILVER AND STERLING EXCHANGE**

Apr.	21	22	23	25	26	27
New York	53 3/4	53 3/4	53 3/4	53 3/4	53 3/4	54 1/4
London	24 1/8	24 3/8	24 3/8	24 1/2	24 3/8	24 7/8
Sterling Ex.	4.8775	4.8780	4.8780	4.8785	4.8790	4.8810

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

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

	1909.	1910.	Changes.
India	£1,175,400	£1,896,800	I. £ 721,400
China	983,200	1,088,500	I. 105,300
Straits	82,800	.....	D. 82,800
Total	£2,241,400	£2,985,300	I. £ 743,900

Average paid for India Council bills in London was 16.09d. per rupee.

Copper, Tin, Lead and Zinc

Apr.	Copper.			Tin.	Lead.		Zinc.
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.	Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.	St. Louis, Cts. per lb.
21	12 $\frac{7}{8}$ @13 $\frac{3}{8}$	12 $\frac{1}{2}$ @12 $\frac{3}{4}$	56 $\frac{3}{4}$	33 $\frac{3}{8}$	4.35 @4.40	4.20 @4.25	5.22 $\frac{1}{2}$ @5.25
22	12 $\frac{7}{8}$ @13 $\frac{3}{8}$	12 $\frac{1}{2}$ @12 $\frac{3}{4}$	56 $\frac{3}{4}$	33 $\frac{3}{8}$	4.35 @4.40	4.20 @4.25	5.20 @5.22 $\frac{1}{2}$
23	12 $\frac{7}{8}$ @13 $\frac{3}{8}$	12 $\frac{1}{2}$ @12 $\frac{3}{4}$	...	33	4.35 @4.40	4.20 @4.25	5.15 @5.20
25	12 $\frac{7}{8}$ @13 $\frac{3}{8}$	12 $\frac{1}{2}$ @12 $\frac{3}{4}$	56 $\frac{3}{4}$	33	4.35 @4.40	4.20 @4.25	5.15 @5.20
26	12 $\frac{7}{8}$ @13 $\frac{3}{8}$	12 $\frac{1}{2}$ @12 $\frac{3}{4}$	56 $\frac{3}{4}$	32 $\frac{3}{8}$	4.35 @4.40	4.20 @4.25	5.10 @5.15
27	12 $\frac{7}{8}$ @13 $\frac{3}{8}$	12 $\frac{1}{2}$ @12 $\frac{3}{4}$	56 $\frac{3}{4}$	32 $\frac{3}{8}$	4.35 @4.40	4.20 @4.25	5.07 $\frac{1}{2}$ @5.10

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**—While domestic consumers have shown a singular indifference to the low prices at which the metal is selling, European buyers have been steadily in the market but are necessarily endeavoring to get their supplies on a scale downward. In this they are supported by the tendency of the standard market, which brings electrolytic copper out of warehouse right along into competition with shipments from this side. The market closes barely steady at 12 $\frac{7}{8}$ @13c. for Lake copper, and 12 $\frac{1}{2}$ @12 $\frac{3}{4}$ c. for electrolytic copper in cakes, wirebars and ingots. Casting copper is quoted nominally at 12 $\frac{3}{8}$ @12 $\frac{3}{4}$  cents.

Copper sheets are 19@20c. base for large lots. Full extras are charged, and higher prices for small quantities. Copper wire is 14 $\frac{1}{4}$ c. base, carload lots at mill.

Business in the London standard market has been rather dragging and prices have been hovering around bottom for several days, closing steady at £56 5s. for spot and £57 5s. for three months.

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

Henry R. Merton & Co., of London, report under date of April 16, that the recent concessions in prices tended to clear up the situation abroad. Calumet & Hecla reduced its asking price to about £61 (13.2c., c.i.f.) while electrolytic brands were freely offered by American producers below £60 (13c., c.i.f.) "This energetic policy proved to be a timely move, inasmuch as it attracted consumers to an important extent, and gave the producers an opportunity of relieving themselves of very large quantities of refined copper for May and June delivery. The business thus consummated was of an unusually heavy description, extending to

all branches of the trade and giving the best evidence of the wonderful activity which is now prevailing in the copper-consuming industry." The National Conduit and Cable Company, of New York, in its circular of April 20, takes an extremely pessimistic view of the situation, but it declares that "all the large manufacturers were busy throughout the first quarter of 1910, although being well covered ahead they were not anxious buyers."

Copper exports from New York and Philadelphia for the week were 2774 long tons. Our special correspondent gives the exports from Baltimore at 1569 tons copper.

**Tin**—While during the second half of last week dealings in the London market showed a lack of interest on the part of manipulators, it became evident that the spot situation was very well controlled by the bull party. In consequence, the contango between spot and futures which had right along ruled at about £1 15s. @ £2, was at one time reduced to 7s. 6d. At the beginning of this week, transactions increased in volume, at the expense of values, however. Reports from this side of severe damage to fruit and vegetable crops were to a large extent the cause of the decline. At the close the market is cabled as steady at £149 17s. 6d. for spot and £150 17s. 6d. for three months.

In the domestic market, tin is being offered continuously at prices ruling below the equivalent at which it can be imported, but consumers do not take advantage of this opportunity to supply their wants for future delivery. Business is confined to spot or near-by shipment only. At the close, tin can be bought at about 32 $\frac{7}{8}$  cents.

Exports of tin from the Straits in March were 2877 long tons, making a total of 12,919 tons for the three months ended March 31; a decrease of 227 tons.

**Lead**—The market is quiet and unchanged at 4.35@4.40c., New York, and 4.20@4.25c., St. Louis.

The London market is without any special feature and the closing quotations are unchanged at £12 12s. 6d. for Spanish lead and £12 15s. for English.

**Spelter**—The protracted absence of buyers is beginning to tell on the nerves of the sellers, who have been offering concessions in prices from day to day, without, however, bringing out much business. The close is weak at 5.07 $\frac{1}{2}$ @5.10c. St. Louis, and 5.22 $\frac{1}{2}$ @5.25c. New York.

New York quotations for spelter, April 21, were 5.37 $\frac{1}{2}$ @5.40c.; April 22, 5.35@5.37 $\frac{1}{2}$ c.; April 23 and 25, 5.30@5.35c.; April 26, 5.25@5.30c.; April 27, 5.22 $\frac{1}{2}$ @5.25 cents.

The London market declined to £22 for good ordinaries, and £22 15s. for specials.

Base price of zinc sheets is \$7.75 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

Other Metals

**Aluminum**—Sales and inquiries are large and there is an upward tendency. Prices are unchanged at 23 $\frac{1}{4}$ @23 $\frac{3}{4}$ c. per lb. for No. 1 ingots in large lots. Sales abroad are very good, especially in Germany and France, and makers look for higher quotations. The automobile industry is taking a good deal of metal, both here and in France.

**Antimony**—The most marked feature of the market is its dullness. Business is of a retail order only, and prices are nominally unchanged. Quotations are 8 $\frac{3}{8}$ @8 $\frac{1}{2}$ c. for Cookson's; 7 $\frac{7}{8}$ @8c. for U. S.; 7 $\frac{3}{8}$ @7 $\frac{1}{2}$ c. for outside brands.

**Quicksilver**—The market here is steady and sales are improving. New York quotations are firm at \$48 per flask of 75 lb.; jobbers ask 67@69c. per lb. for small lots. San Francisco, \$47.50@48 for domestic orders, and \$2 less for export. The London price has been reduced to £9 per flask; jobbers sell at the same price.

**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. The German price for cadmium, 99 $\frac{1}{2}$  per cent. pure, is 500 marks per 100 kg. for large lots, and 550 marks for smaller orders—54c. and 59.4c. per lb. f.o.b. works in Silesia.

British Metal Imports and Exports

Imports and exports of metals in Great Britain, three months ended March 31, figures in long tons, except quicksilver, which is in pounds:

Metals:	Imports.	Exports.	Excess.
Copper, long tons	36,904	15,909 Imp.	20,995
Copper, 1909....	30,131	18,865 Imp.	11,266
Tin, long tons....	11,655	10,956 Imp.	699
Tin, 1909.....	10,380	10,099 Imp.	281
Lead, long tons...	51,962	11,899 Imp.	40,063
Lead, 1909.....	52,905	11,241 Imp.	41,664
Spelter, 1 $\frac{1}{2}$ tons...	32,665	2,352 Imp.	30,313
Spelter, 1909....	27,417	1,564 Imp.	25,853
Quicksilver, lb....	1,311,792	243,177 Imp.	1,068,615
Quicksilver, '09	893,993	270,196 Imp.	623,797
Ores:			
Tin ore and con.	6,021	..... Imp.	6,021
Tin ore, 1909...	5,137	..... Imp.	5,137
Pyrites.....	203,142	..... Imp.	203,142
Pyrites, 1909...	205,547	..... Imp.	205,547

Copper totals include metallic contents of ore and matte. Exports include re-exports of foreign material. Of the imports in 1910, the United States furnished in all 73 tons copper matte, 13,529 tons fine copper, and 5423 tons lead. This lead was chiefly Mexican, refined in this country.

Zinc and Lead Ore Markets

Platteville, Wis., April 23—The highest price paid this week for zinc ore was \$43.50; the base price, 60 per cent. zinc, was \$41@42.50 per ton. No sales of lead ore were reported.

SHIPMENTS, WEEK ENDED APRIL 23.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Mineral Point.....	748,300	.....	.....
Highland.....	312,000	.....	.....
Platteville.....	298,230	.....	51,900
Galena.....	165,740	.....	.....
Dubuque.....	75,900	.....	.....
Linden.....	63,450	.....	.....
Cuba City.....	55,000	.....	52,000
Total.....	1,717,720	.....	103,900
Year to date.....	25,727,620	1,747,939	4,610,290

In addition to the above there was shipped during the week to the separating plants, 1,294,470 lb. zinc concentrates.

Joplin, Mo., April 23—A base price of \$45 per ton of 60 per cent. zinc was paid in settlement for zinc sulphide ore this week—ore purchased at the end of last week for early delivery. The highest base offering this week was \$43, and from this it ranged down to \$38. One purchasing agency that has been paying a base of \$44 per ton of 60 per cent. zinc for ores carrying over 4 per cent. of iron was instructed this week to drop the price to \$38. Another agency that was pay-

SHIPMENTS, WEEK ENDED APRIL 23.

	Zinc, lb.	Lead lb.	Value.
Webb City-Carterville	5,012,950	625,630	\$118,406
Joplin.....	2,347,380	214,850	54,612
Duenweg.....	961,370	47,830	24,023
Oronogo.....	681,930	.....	14,466
Galena.....	618,680	67,560	14,337
Alba-Neck.....	594,280	.....	12,862
Granby.....	642,400	3,750	9,470
Miami.....	583,060	70,230	8,168
Carthage.....	368,710	.....	8,067
Spurgeon.....	391,800	77,500	7,067
Badger.....	262,070	2,390	5,553
Sarcoxi.....	329,550	.....	5,403
Quapaw.....	75,660	96,660	3,891
Aurora.....	290,490	12,670	3,772
Carl Junction.....	114,690	.....	2,523
Cave Springs.....	74,790	.....	1,421
Greenfield.....	63,670	.....	700
Totals.....	13,151,570	1,219,070	\$294,741

17 weeks.....190,246,380 27,409,820 \$4,643,582  
 Zinc value, the week, \$264,443; 17 weeks, \$3,907,728  
 Lead value, the week, 30,298; 17 weeks, 705,854

MONTHLY AVERAGE PRICES.

Month.	ZINC ORE.				LEAD ORE.	
	Base Price.		All Ores.		All Ores.	
	1909.	1910.	1909.	1910.	1909.	1910.
January.....	\$41.25	\$47.31	\$38.46	\$45.16	\$52.17	\$56.99
February.....	36.94	40.69	34.37	39.47	50.50	53.64
March.....	37.40	43.60	34.71	39.71	50.82	51.26
April.....	38.63	.....	37.01	.....	55.63	.....
May.....	40.06	.....	37.42	.....	56.59	.....
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.

ing a \$44 base dropped its price to a \$42 base. Zinc silicate sold on a base of \$21 @25 per ton of 40 per cent. zinc with the highest price at \$30. The highest price, all grades, was \$46 and the average was \$40.20 per ton. Lead of 80 per cent, grades and better is still selling at \$50 per ton, with deductions of \$1 per ton for each 1 per cent. under 80. The average price, all grades, was \$49.70 per ton.

Miners from the coalfields of Kansas, out of employment on account of the strike, are being attracted here by the high wages, and as the mines are well supplied with natural gas no reduction in output is occasioned by shortage in the supply of coal.

CHEMICALS

New York, April 27—The general market is still quiet, with only a moderate amount of new business.

Copper Sulphate—Business is steady and the market shows no change. Prices continue \$4.10 per 100 lb. for carload lots and \$4.35 for smaller orders.

Arsenic—The market is dull and no large sales are reported for the week. Quotations are \$2.40@2.50 per 100 lb. for white arsenic.

Phosphates—Shipments of hard rock phosphates from the Florida mines for the three months ended March 31 are reported at 78,281 tons, a decrease of 36,081 tons from last year. Shipments of land pebble were 213,016 tons, an increase of 8125 tons.

Sulphur—Best unmixed seconds are quoted at \$22@22.50 per ton, New York.

Nitrate of Soda—The market is much slower than it has been. Spot nitrate still holds at 2.15c. per lb., but futures are quoted at 2.02½@2.05c. per lb., a slight weakening.

MINING STOCKS

New York, April 27—The general stock market has not materially changed since last week. Chiefly a professional market, it has been weak and uncertain, with a general downward tendency, and a disposition to make the most of all news that might be considered unfavorable. It has been a bear market for the most part, with no apparent effort on the part of anyone to sustain it or turn its course.

The increase in the dividend rate on Steel common from 4 to 5 per cent. yearly, had no marked effect on the market beyond a short-lived and small advance.

The Curb has followed the Exchange with a weak and uncertain market and declining quotations. The copper stocks were on the decline, but on moderate dealings. Outside of the coppers there was some activity in Cobalt Central, which declined on heavy sales. Other mining stocks received little attention.

Boston, April 26—Copper shares have shown very little animation of late. North Butte had an active spell and a \$4 break, touching \$31, which is within \$1 of its low price of \$30 made earlier in the year. Although the minority interest did not succeed in getting representation on the board of directors at the annual meeting broker C. A. Clark accomplished some good in that the company's officials have promised to make public reports and have allowed an Eastern mining man the privilege of going down into the mine. The price of the stock recovered to above \$34.

COPPER PRODUCTION REPORTS.

Copper contents of blister copper, in pounds.

Company.	January.	February.	March.
Arizona, Ltd.....	2,646,000	2,658,000	2,886,000
Boleo (Mexico).....	2,644,800	2,331,832	2,148,383
Copper Queen.....	10,001,000	8,927,203	10,809,488
Calumet & Ariz.....	2,331,000	2,024,000	2,820,000
Cananea (Mexico).....	3,500,000	3,586,000	3,700,000
Detroit.....	2,166,155	1,486,400	1,698,975
Imperial.....	850,000	750,000	825,000
Nevada Con. (Est.).....	3,800,000	5,000,000	5,600,000
Old Dominion.....	2,130,000	2,035,000	2,674,000
Shannon.....	1,510,696	1,526,000	1,468,000
Superior & Pitts.....	2,166,000	1,854,000	2,370,000
Utah Copper Co.....	4,745,066	5,798,819	8,190,000
Butte District.....	19,250,000	13,758,620	24,000,000
Lake Superior.....	19,260,127	18,250,000	19,250,000
Total production.....	77,000,845	69,995,874	88,439,846
Imports, bars, etc.....	24,305,526	14,089,381	.....
Imp. in ore & matte.....	7,053,522	6,063,764	.....
Total.....	108,359,893	90,153,019	.....

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 Nacoziari. Boleo copper does not come to American refiners. Utah Copper report for March includes for the first time the output of the Boston mill.

STATISTICS OF COPPER.

Month.	United States Product'n.	Deliveries Domestic.	Deliveries for Export.
IV, 1909.....	113,574,292	47,546,010	65,110,111
V.....	118,356,146	61,163,325	70,542,753
VI.....	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	56,261,288
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	37,369,517
III.....	120,067,467	62,844,818	40,585,767

VISIBLE STOCKS.

	United States.	Europe.	Total.
IV, 1909.....	182,279,902	115,024,000	297,303,902
V.....	184,198,073	114,050,320	297,248,393
VI.....	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.....	153,008,527	236,857,600	389,866,127
I, 1910.....	141,766,111	244,204,800	385,970,911
II.....	98,463,339	248,236,800	346,700,139
III.....	107,187,392	254,150,400	361,337,792
IV.....	123,824,874	249,625,600	373,450,474

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.

It is the general opinion that copper stocks have been sold to a standstill and that all offerings of the better class have gone into a bag.

There has been no news from the newer Lake Superior properties, although Lake stock shows wide variations according to the buying or selling. During the week it has had an extreme fluctuation of \$8, making a low at \$49.50, from which it has recovered to \$52. North Lake went off \$2 to \$14.25 and Indiana over \$5 to below \$25. Offerings of Calumet & Arizona, Granby and Utah Consolidated have ceased and the market for each has steadied.

Butte Coalition directors have declared the usual quarterly 25c. dividend, yet the stock is heavy around \$21.

Curb prices have been weak, noticeably so for New Baltic, Bohemia, South Lake and Rhode Island Coal.

Assessments

Table with columns: Company, Delinq., Sale, Amt. Lists various companies like Blue Bell, Idaho, Brownstone, Utah, etc.

Monthly Average Prices of Metals SILVER

Table with columns: Month, New York, London. Shows monthly price trends for silver.

New York, cents per fine ounce; London, pence per standard ounce.

COPPER.

Table with columns: NEW YORK, Lake, London. Shows monthly average prices for copper.

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling per long ton, standard copper.

TIN AT NEW YORK

Table with columns: Month, 1909, 1910. Shows tin prices for various months.

Prices are in cents per pound.

LEAD

Table with columns: Month, New York, St. Louis, London. Shows lead prices for various months.

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Table with columns: Month, New York, St. Louis, London. Shows spelter prices for various months.

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PRICES OF PIG IRON AT PITTSBURG.

Table with columns: Bessemer, Basic, No. 2 Foundry. Shows pig iron prices for various months.

STOCK QUOTATIONS

Table with columns: Name of Comp., Bid, Clg. Lists various stock prices like Acacia, Cripple Crk Con., etc.

SAN FRANCISCO. April 26.

Table with columns: Name of Comp., Clg. Lists various stock prices like COMSTOCK STOCKS, Atlanta, Belmont, etc.

N. Y. EXCH. Apr. 26

Table with columns: Name of Comp., Clg. Lists various stock prices like Amalgamated, Am. Agri. Chem., etc.

N. Y. CURB Apr. 26

Table with columns: Name of Comp., Clg. Lists various stock prices like Benanza Creek, Boston Copper, etc.

BOSTON CURB Apr. 26

Table with columns: Name of Comp., Clg. Lists various stock prices like Ahmeek, Bingham Mines, etc.

†Last quotation.